Evaluation of the East Asia and Pacific Summer Institutes Program: Final Report

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This report includes data from the Survey of Doctoral Recipients (SDR) and the National Survey or Recent College Graduates (NSRCG). The use of NSF data does not imply NSF endorsement of the research, research methods, or conclusions in this report.

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Executive Summary

The scientific and engineering enterprise is itself increasingly global.... International boundaries have become considerably less important in structuring the conduct of research and development.[1]

Students in science and engineering (S&E) are preparing for careers in fields where international partnerships are increasingly important to advancing knowledge and discoveries. It has been over a decade since the National Science Board (NSB) highlighted the importance of international collaboration and called for increased government commitment to promoting international S&E research and education.[2] NSB called for the National Science Foundation (NSF) to take a leadership role in international S&E research and education activities promoting "…increased participation in international S&E activities by younger U.S. scientists and engineers from diverse backgrounds, especially those in the early stage of their careers, in order to develop an internationally competitive and globally-engaged S&E workforce." [3]

NSF's Office of International Science and Engineering (OISE) helps to further NSF's commitment to support the active engagement of early-career S&E researchers in international collaborations. Among its programs is the East Asia and Pacific Summer Institutes (EAPSI), which provides international fellowships to U.S. graduate students in S&E.

NSF contracted with Abt Associates to conduct an evaluation of the EAPSI program to investigate whether it was meeting its goal of providing U.S. graduate students with international experiences that will enable future collaboration with foreign peers. This report presents the findings from this evaluation.

The evaluation found evidence that the EAPSI program is meeting its goals to:

- introduce U.S. graduate students to East Asia and Pacific science and engineering in the context of a research setting; and
- help students initiate scientific relationships that will better enable future collaboration with foreign counterparts.

The evaluation also found evidence of broader benefits, finding that the program helps to orient fellows to the host's society, culture, and language, and provides benefits that extend beyond the EASPI fellows.

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1 National Science Board. 2001. *Toward a More Effective Role for the U.S. Government in International Science and Engineering.* NSB-01-187. National Science Foundation: Arlington, VA., p. 12.

2 National Science Board. 2001.

3 National Science Board. 2000. *Toward a More Effective NSF Role in International Science and Engineering, Interim Report.* NSB-00-217. National Science Foundation: Arlington, VA., p. 10

Key Findings

To investigate the progress of the program toward its goals, the evaluation paid particular attention to the opportunities for international research collaborations, the experiences that develop research capacity and global perspectives, and the relationships between U.S. and foreign researchers.

1. What are the program experiences of program participants and managers?
2. Does the extent to which former fellows engage in international collaborations differ from that of unfunded applicants?
3. Do fellows' post-award career activities and job characteristics differ from those of unfunded applicants?
4. What are the perceived outcomes of program participation?
5. Do the outcomes of program participation extend beyond the direct participants?

The evaluation demonstrated that individuals derive benefits from the program, both on an individual and a collective basis.

Introduce Students to East Asia and Pacific Science and Engineering Research

Research experiences that included collaborations with foreign scientists at their host sites were central to the fellows' EAPSI program experiences.

- Overall, fellows were satisfied with their EAPSI research activities and interactions with their host. All EAPSI fellows would recommend the fellowship to another graduate student seeking an international experience, 92 percent of advisors would or have recommended the program to other graduate students, and 79 percent of hosts would or have recommended hosting an EAPSI fellow to others.
- EAPSI offers graduate students an opportunity to conduct research in foreign locations and to establish relationships that they may build on subsequently in their careers. A majority of fellows reported that they were very satisfied with their host's expertise (81 percent) and the match between their research interests and the host's (63 percent).
- A minority of fellows noted difficulties related to their research activities and host interactions. Among the difficulties cited were not enough guidance from the host (17 percent), and being assigned a role that was less than merited by their skills or knowledge (5 percent). Less than 10 percent of hosts reported specific challenges regarding collaborating on research with their fellow.

Initiate Relationships That Enable Future International Collaborations

A key goal of the EAPSI program is to help students initiate scientific relationships that will better enable future collaboration with foreign scientists. Although fellows and unfunded applicants similarly work with individuals in other countries, the evaluation provides evidence that the EAPSI experiences lead to more productive international research collaborations.

- Although EAPSI forges new relationships for the fellows, about half of the fellowships build on some existing relationships. Only 15 percent of hosts reported that they knew their prospective fellow prior to him/her applying. Almost half (45 percent) of the hosts, however, knew the graduate advisor of the prospective fellow.
- Fellows had the opportunity to work with a range of individuals at the host institution. Hosts most frequently reported that their fellow worked with the host (80 percent), graduate students in the host's research group (66 percent), and other scientists in the host's research group (45 percent).
- A majority of the fellows indicated that their relationship with the host has continued beyond the fellowship period, through subsequent research collaborations with the host (20 percent), and/or additional communications (60 percent). Hosts had similar responses to the fellows, as 29 percent stated that they had further collaborated with the fellow and 48 percent had communications with the fellow post-fellowship.
- Unfunded applicants continued to pursue other avenues for their international experiences. EAPSI fellows and unfunded applicants with PhDs held a similar number of international postdoctoral fellowships (0.32 versus 0.28 fellowships, respectively), yet fellows were less likely than unfunded applicants to have been employed outside the U.S. (13 versus 39 percent, respectively).
- Forty percent of fellows and 35 percent of unfunded applicants report working with individuals located in other countries. Among those who work with a collaborator in a foreign country, unfunded applicants were statistically more likely to report that their collaboration included joint publications or jointly developed products (82 versus 92 percent).
- Compared to unfunded applicants, fellows reported a higher number of publications co-authored with a foreign collaborator (2.2 versus 1.6 publications) and a larger proportion of publications that include a foreign co-author (22 versus 17 percent), suggesting that fellows have more productive collaborations with foreign counterparts than do unfunded applicants.
- Benchmarking analyses comparing career outcomes of EAPSI fellows to national estimates for similar science and engineering PhD graduates found that EAPSI fellows were more likely to be working with individuals in other countries (80 percent of fellows holding a PhD versus 30 percent of the SDR sample).

Extend Benefits Beyond EAPSI Fellows

The experiences extend beyond the specific participants and seed additional international S&E research activities. As such, EAPSI contributes to NSF's efforts promote international S&E among early-career scientists and engineers.

- As reported by host site representatives, host countries become involved in EAPSI to increase research collaborations with the U.S., to establish a research network and ongoing relationships between scientists, and to provide younger researchers from the U.S. with an opportunity to understand the R&D activities in their countries.

- About one-third of fellows reported that other researchers from their home institution became involved in the research project during the EAPSI fellowships.
- EAPSI fellows continue to promote international collaborations after they return to the U.S. More than half of the fellows engaged in activities where they extended the benefits of their EAPSI participation with others, particularly by sharing resources they collected or tools developed during their fellowship (59 percent) and teaching others about the research methods they learned during that time (56 percent).
- Fellows were significantly more likely than unfunded applicants to engage in a series of activities to foster international collaborations among others (40 percent versus 30 percent, respectively).
- Host site representatives identified several benefits of the program for those involved—fellows, other students in the host lab or institution, host researchers, and the host institutions and countries. Respondents commonly cited increased opportunities for collaboration and networking as benefits of participation.
- Host researchers most commonly reported that they agreed to serve as a host in the program because of a shared interest in the prospective fellow's research project (64 percent), an interest in creating an international environment in their research group (59 percent), and to establish or maintain collaboration with a U.S. researcher (57 percent).
- As a result of the EAPSI experience, most hosts identified some benefit; only 11 percent perceived no personal benefits from their participation. The most common benefits selected by respondents included enhanced interest in collaborating with U.S. researchers (31 percent), established or renewed collaborations with other U.S. researchers (30 percent), and published papers based on the research conducted (25 percent).

Additional Findings

The evaluation was also designed to address the following questions:

1. What are the characteristics of people who apply for and participate in the EAPSI program?
2. What motivates individuals to apply for and participate in the program, and what are individuals' experiences during the application process?

The EAPSI applicants represent graduate students with varied backgrounds and motivations for participating in the program.

- Applicants most commonly applied to EAPSI to enhance their skills or knowledge as a researcher (82 percent).
- The majority of EAPSI applicants did not have extensive academic and travel experiences outside the U.S. at the time of application. Thus, through the research opportunities, EAPSI introduced fellows to international experiences. Only 36 percent of applicants participated in study abroad programs as undergraduates or graduate students, and 18 percent had attended elementary or

secondary school outside the U.S. Around one-third had lived outside the U.S. for six months or longer (35 percent) or visited or lived in one of the seven EAPSI host locations for a month or longer (30 percent). Less than a quarter of applicants (22 percent) reported that they had attended a research conference outside the U.S.

- A majority of hosts agreed that that their research interests were well-matched with those of their fellow (82 percent), and that they and the fellow shared similar goals and expectations for the EAPSI experience (60 percent).

Applicants are also drawn to EAPSI in part because it provides an opportunity to learn about the society, culture, and language of host sites. Nearly all fellows reported participating in cultural and leisure activities while abroad, and a larger majority reported becoming comfortable with the traditions and culture of their host site.

- Applicants commonly reported applying to EAPSI in part to learn about the culture, history, and geography of another country (77 percent), and to conduct research with a specific person or at a specific institution (70 percent).
- Nearly all fellows participated in cultural and leisure activities in their host site which included sightseeing (97 percent), exploring the landscape or geography (91 percent), and visiting museums (89 percent).
- Among fellows placed in primarily non-English speaking host sites—Japan, Korea, Taiwan, and China—67 percent reported some type of language training in preparation for their international fellowship experience. This included self-guided study (47 percent), a formal language training course (23 percent), and working with a conversational partner or tutor (9 percent).
- Communication or language issues were the most frequently cited difficulties that fellows encountered during their fellowship; however, this varied significantly by host site where a greater number of fellows in primarily non-English speaking host sites experienced these difficulties (28 to 44 percent within these sites) than fellows in primarily English-speaking host sites—New Zealand, Australia, and Singapore (0 to 10 percent within these sites).

Evaluation Approach

The evaluation was designed to assess how the EAPSI program contributes to the engagement of early-career S&E researchers in international research collaborations. The study incorporated both extant and primary data sources. These included surveys administered to program applicants (both those who received EAPSI fellowships and those who did not), EAPSI foreign hosts, and EAPSI graduate advisors, as well as telephone interviews with EAPSI agency officials and managers at foreign counterpart agencies. The study included both descriptive and comparative analyses, including a rigorous quasi-experimental design to answer the questions about program impacts.

Propensity score analysis (PSA) was used to construct groups of awardees and non-awardees that were statistically similar across a number of pre-existing characteristics, in order to compare the outcomes of fellows to those of unfunded applicants, using pre-award characteristics of applicants

to mitigate the potential threat of selection bias. To situate the EAPSI program participants' and applicants' outcomes within the national S&E context, a secondary set of comparative analyses was conducted using data from the Survey of Doctoral Recipients (SDR) and the National Survey of Recent College Graduates (NSRCG). The evaluation also used descriptive analyses to explore the pre-award international research experiences and other characteristics of EAPSI applicants and host scientists; to understand what motivated STEM graduate students to apply for an EAPSI fellowship and what led EAPSI host scientists to host a fellow, the perceptions and role of EAPSI advisors, and to describe the experiences of EAPSI participants (i.e., fellows and hosts), both during and after the period of the fellowship.

1 Introduction

The scientific and engineering enterprise is itself increasingly global. ... International boundaries have become considerably less important in structuring the conduct of research and development.[4]

Students in science and engineering (S&E) are preparing for careers in fields where international partnerships are increasingly important to advancing knowledge and discoveries. It has been over a decade since the National Science Board (NSB) highlighted the importance of international collaboration and called for increased government commitment to promoting international S&E research and education.[5] NSB called for the National Science Foundation (NSF) to take a leadership role in international S&E research and education activities promoting "…increased participation in international S&E activities by younger U.S. scientists and engineers from diverse backgrounds, especially those in the early stage of their careers, in order to develop an internationally competitive and globally-engaged S&E workforce." [6]

The Office of International Science and Engineering (OISE) serves as a primary hub within NSF for international research opportunities for United States (U.S.) scientists and engineers. OISE's East Asia and Pacific Summer Institutes (EAPSI) program, which provides international fellowships to U.S. graduate students in S&E, is one program which helps to further NSF's commitment to support the active engagement of early-career S&E researchers in international collaborations. Highlights generated by NSF that describe specific EAPSI fellowships are included in Appendix A.

In August 2009, NSF contracted with Abt Associates to conduct an evaluation of the EAPSI program to investigate whether it was meeting its goal of providing U.S. graduate students with international experiences that will enable future collaboration with foreign peers. The study involved applicants for the 2000 to 2009 summers, , their advisors and foreign hosts, and the program officials who are familiar with EAPSI in each of the seven program locations. This report presents the findings from the evaluation.

Chapter 1 of this report describes the EAPSI program and situates it within recent trends in international scientific research. The report then describes the methodology used to conduct the evaluation (Chapter 2); characteristics of EAPSI applicants as well as their and the hosts' motivations for participation (Chapter 3); respondents' experiences with and perceptions of the program (Chapter 4); outcomes of the program (Chapter 5); and conclusions and implications of the evaluation findings. The appendices included with this report provide additional details: Appendix A contains NSF-generated descriptions of specific EAPSI fellowships, Appendices B through D describe methodological details, Appendix E contains the survey instruments, and Appendix F contains a comparison of EAPSI applicants to national data on career outcomes.

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4 National Science Board. 2001. *Toward a More Effective Role for the U.S. Government in International Science and Engineering.* NSB-01-187. National Science Foundation: Arlington, VA., p. 12.

5 National Science Board. 2001.

6 National Science Board. 2000. *Toward a More Effective NSF Role in International Science and Engineering, Interim Report.* NSB-00-217. National Science Foundation: Arlington, VA., p. 10

1.1 The EAPSI Program

EAPSI provides a $5,000 stipend and travel costs to and from the host site to support U.S. graduate students to spend the summer (eight to ten weeks) conducting research in Australia, China, Japan, Korea, New Zealand, Singapore, or Taiwan[7]; hosting organizations provide additional support to cover living expenses (training, food, and lodging) in the host country. The program is designed to immerse U.S. scholars in the scientific and social culture of the host location. Fellows are encouraged to visit other institutions within the host country, to get a broader perspective on its science and engineering enterprise. Since the program's inception, over 2,000 U.S. graduate students have participated in the program.

The program logic model (Exhibit 1.1) identifies the links between program processes and outcomes, and helped ground the evaluation in the program's theory. As depicted in the logic model, the goals of the EAPSI program are to "to introduce U.S. graduate students to East Asian science and engineering in the context of a research setting, and to help students initiate scientific relationships that will better enable future collaboration with foreign counterparts." The programmatic strategy for meeting these goals is to provide U.S. graduate students with first-hand experience conducting research in one of the participating countries of East Asia and the Pacific; an introduction to science, science policy, and scientific infrastructure of the host location; and a chance to experience the society, culture, and language of the host country.[8]

Funding for the EAPSI program has grown substantially over the past decade, from approximately $500,000 in 2000 to almost $2 million in 2009. The award amount and the number of awards have also increased over the same time period, from $2500 to $5000 and from 140 to 195, respectively. The program has expanded in scope over the years; for instance, when the summer experiences program launched in 1990, Japan was the only host country. Since then the number of host countries has gradually increased with the addition of Korea in 1995 Taiwan in 2000, China and Australia in 2004, New Zealand in 2007, and Singapore in 2009. The fellowship period has remained the same since the beginning of the program: each institute, except for Japan, lasts for approximately eight weeks; the Japan institute lasts approximately 10 weeks during the summer.

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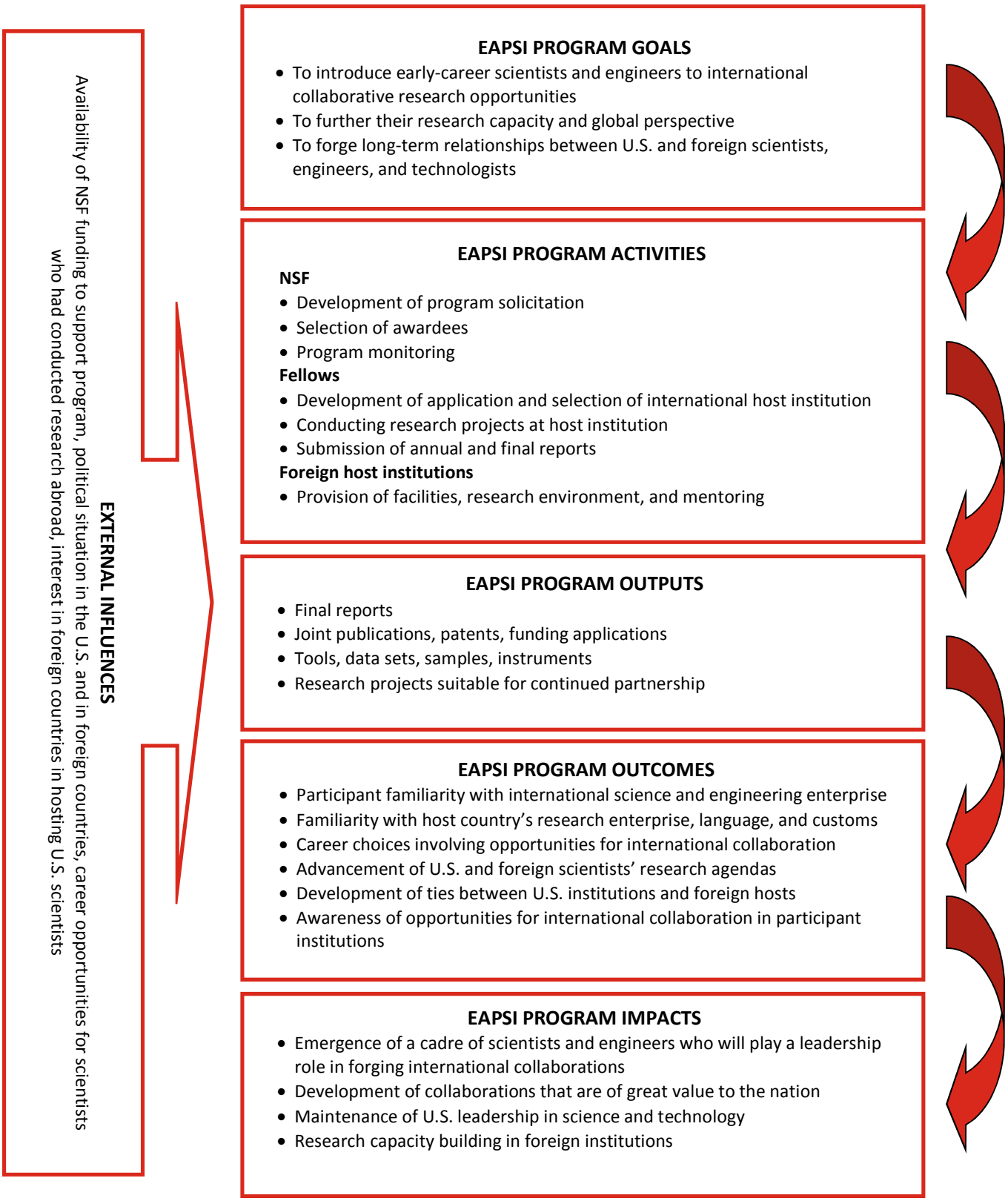
7 The program was not referred to as EAPSI until Australia became a host site in 2004. Prior to 2004, the name of the program changed each time a new host country joined the program. For example, the program was called Summer Program in Japan from 1990 to 1994 until Korea joined in 1995 and the name changed to Summer Programs in Japan and Korea.

8 National Science Foundation. 2010. East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI) program solicitation. http://www.nsf.gov/pubs/2010/nsf10591/nsf10591.htm

Exhibit 1.1: EAPSI Logic Model



1.2 Globalization of Science and Engineering

A decade ago, the NSB noted that "international boundaries have become considerably less important in structuring the conduct of research and development" in S&E fields.[17] Ten years later, the globalization of S&E research and education continues.[9] Recent data show that while the U.S. is still a major global force in S&E research and education, other countries are increasing their competiveness in these areas. For example, countries are increasingly competing with the U.S. for foreign students, and top student destinations include countries such as the United Kingdom, Germany, and France; the proportion of foreign students in the U.S. decreased from 25 percent in 2000 to 20 percent in 2006.[10] Additionally, other countries are producing more S&E graduates than the United States; of the more than 4 million first university S&E degrees awarded worldwide in 2006, 21 percent were earned by students in China, 19 percent by students from the European Union, and only 11 percent by students in the U.S.[11]

Data also show that foreign nations are placing a great effort on developing a skilled S&E workforce that can compete internationally. For instance, between 1997 and 2007, the estimated number of S&E researchers in the U.S. grew by 40 percent to reach approximately 1.4 million. However, over the same time period, the number of S&E researchers in China grew by 173 percent to also reach 1.4 million.[12] Additionally, while the U.S. remains the leader in S&E research and development expenditures (accounting for 33 percent of total spending), countries such as China are investing large amounts of funding in their own R&D expenditures (averaging 19 percent annually over the past decade), and the U.S.' R&D/GDP ratio now ranks only eighth among economies tracked by the OECD.[13]

Reflecting the importance of these trends and the associated opportunities and challenges for the U.S., a companion publication, which highlighted the globalization of science and engineering research, was prepared for the *Science and Engineering Indicators 2010*.[14] Further, the Committee on Global Science Policy and Science Diplomacy of the National Research Council convened a workshop to discuss the importance of international science engagement and global science

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9 National Science Board. 2012. *Science and engineering indicators 2012.* NBS-12-01. National Science Foundation: Arlington, VA.

10 National Science Board. 2010a. *Science and engineering indicators 2010.* NBS-10-01. National Science Foundation: Arlington, VA.

11 National Science Board. 2010a.

12 National Science Board. 2010a.

13 National Science Board. 2010a.

14 National Science Board. 2010b. Globalization of science and engineering research: A companion to science and engineering indicators 2010. NBS-10-3. National Science Foundation: Arlington, VA.

cooperation, and the potential of science policy and science diplomacy in meeting international challenges. [15]

In light of these trends, it is important that the U.S. fully engage in international collaborations. By establishing international networks of scientists, resources can be shared and ideas can be developed, tested, and implemented across traditional boundaries.[16] These partnerships can also serve as a powerful tool of international diplomacy. As the NSB explains, "science and engineering partnerships can strengthen international relationships and…promote basic scientific values such as accountability, meritocracy, transparency, and objectivity," and policymakers have noted that the inclusion of developing nations in these collaborative efforts can promote self-sufficiency and encourage international participation in a variety of areas.[17]

1.3 Programs Promoting International Research Collaboration

Funding for international science and engineering partnerships is concentrated in three federal agencies: the Department of Defense (DOD), the National Institutes of Health (NIH), and NSF (NSB 2008).[18] Within NSF, OISE serves as a focal point for international science and engineering activities both inside and outside NSF. OISE supports programs to expand and enhance leading-edge international research and education opportunities for U.S. scientists, engineers, and graduate students especially at the early-career stage. It works to build and strengthen effective institutional partnerships throughout the global science and engineering research and education community, and it supports international collaborations in NSF's priority research areas. OISE is housed within the Office of the NSF Director since its role is Foundation-wide. The Office carries out its functions through close partnership with the NSF Directorates and through its own program activities.

OISE administers the East Asia and Pacific Summer Institutes (EAPSI) program in order to offer early-career researchers an opportunity to forge collaborative relationships with foreign scientists and engineers. Other NSF programs that facilitate short-term international collaborations include the Pan-American Advanced Studies Institutes (PASI) jointly sponsored with the Department of Energy, which funds students or junior researchers to participate in short courses designed to disseminate knowledge and stimulate training and cooperation among researchers from countries in the Americas;[19] and the Catalyzing New International Collaborations program, which provides funding

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15 National Research Council, Committee on Global Science Policy and Science Diplomacy. 2011. *U.S. and International Perspectives on Global Science Policy and Science Diplomacy: Report of a Workshop*. National Academies Press, Washington, DC.

16 National Science Board. 2008. *International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation's Innovation Enterprise.* NSB-08-4.National Science Foundation: Arlington, VA.

17 National Science Board. 2008

18 National Science Board. 2008.

19 National Science Foundation. 2006a. Pan-American Advanced Studies Institutes Program (PASI) (NSF 10-517). Retrieved from http://www.nsf.gov/pubs/2010/nsf10517/nsf10517.pdf

for short-term activities such as planning visits, workshops, initial data-gathering activities, and the development of research network.[20]

Another program sponsored by NSF that aims to promote long-term international collaborative research is the Partnerships for International Research and Education (PIRE) program. This program funds proposals from all areas of NSF-supported science in an effort to: enhance research excellence through international partnerships; promote educational excellence via international collaborations; and strengthen U.S. capacity for international engagement.[21] NSF also sponsors the International Research Fellowship Program (IRFP), which provides support to postgraduate scientists (generally a year or two after the receipt of a doctoral degree) for a 9- to 24-month research experience abroad.[22]

Other U.S. agencies and organizations recognize the value of international collaborations, and have therefore implemented programs to facilitate the international exchange of S&E research. For instance, the National Institutes of Health (NIH) funds the Fogarty International Center, whose programs support global health research conducted through international partnerships, build partnerships between research institutions in the U.S. and abroad, and train the next generation of scientists to address global health issues.[23]

Available evaluation information for these programs, although limited, suggests that participating students reported gaining new knowledge and skills during their international collaboration. Many also reported that they would be likely to engage in international collaborations in the future, perhaps as a result of their international research experience. For instance, an evaluation of NSF's International Research Experience Program (which ended in 2008) found that students who engaged in an international research experience reported gaining technical, communication, and language skills; developed an appreciation for cultural differences; and felt that their research experience would "create opportunities for future international collaboration." [24] An evaluation of the Research Internships in Science and Engineering (RISE) program, which provides funding for undergraduate students to complete summer internships in German higher education institutions, reached similar conclusions. Researchers found that the majority of RISE student participants developed a greater understanding of German culture, the vast majority reported an increased desire to travel abroad,

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20 National Science Foundation. 2006b. Catalyzing New International Collaborations (NSF 11-508). Retrieved from http://www.nsf.gov/pubs/2011/nsf11508/nsf11508.pdf

21 National Science Foundation. 2006c. Partnerships for International Research and Education (PIRE) (NSF 09-505). Retrieved from http://www.nsf.gov/pubs/2009/nsf09505/nsf09505.pdf

22 National Science Foundation IRFP Program Solicitation. http://www.nsf.gov/pubs/2006/nsf06582/nsf06582.html#pgm_desc_txt

23 The John E. Fogarty International Center: U.S. Department of Health and Human Services, National Institutes of Health. (n.d.). Fogarty at 40: Advancing Science for Global Health. Retrieved from http://www.fic.nih.gov/news/publications/fogarty_40th_brochure.pdf

24 Spencer, D. 2008. International research experience program: International research opportunities for students at NSF science and technology centers. Retrieved August 18, 2011 at: http://66.116.177.96/IREP%20Evaluation%20Report.pdf

and about 1 in 4 alumni reported returning to Germany at some point in the future, either to visit or to pursue work/study opportunities.[25] Finally, an evaluation of NSF's International Research and Education in Engineering (IREE) pilot program also found that program participants, especially graduate and postgraduate students, reported acquiring new research skills, and that they planned to continue collaborations with their international counterparts at the end of their program experience.[26]

1.4 Purpose of this Study

The importance of international collaboration cannot be overstated. Promoting international engagement at all levels is crucial to fostering successful research partnerships and developing the next generation of S&E researchers. As preliminary evaluation data demonstrate, providing graduate students and junior researchers with an opportunity to engage in an international research experience may help them improve their own research capabilities and encourage them to pursue future collaborations with their peers abroad. This, in turn, could lead U.S. researchers to reap benefits such as increased visibility in the research community, access to more substantial funding and resources, and the opportunity to benefit from the expertise of international colleagues.

In the climate of budget cuts, federal agencies are under more pressure to demonstrate the value of their programs. To assess the contribution of the NSF EAPSI program to the engagement of early-career S&E researchers in international research collaborations, the evaluation was designed to answer the following questions:

1. What are the characteristics of people who apply for and participate in the EAPSI program?
2. What motivates individuals to apply for and participate in the program, and what are individuals' experiences during the application process?
3. What are the program experiences of program participants and managers?
4. What are the perceived outcomes of program participation?
5. Do fellows' post-award career activities and job characteristics differ from those of unfunded applicants?
6. Does the extent to which former fellows engage in international collaborations differ from that of unfunded applicants?
7. Do the outcomes of program participation extend beyond the direct participants?

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[25] The Institute of International Education. 2009. *Evaluating the DAAD's Research Internships in Science and Engineering (RISE) Program: A Final Report.*

[26] Flattau, P.E., Lal, B., Laskey, A., and Ford, J. J. 2009. *Portfolio Evaluation of the National Science Foundation's Grants Program on "International Research and Education in Engineering" (IREE).* Institute for Defense Analyses, Science & Technology Policy Institute: Washington, DC.

2 Methodology

It was important for this study to both measure individuals' experiences with the program and to investigate the effects of the program on participants, particularly with respect to their international research collaborations. As detailed below, the study used a mixed methods design, incorporating extant and primary data sources, to answer the specific research questions. Further, the evaluation included both descriptive and comparative analyses. The descriptive analysis provided summary information about the characteristics, experiences, and perceptions of individuals involved with the program, as well descriptive comparisons of differences between groups or points in time. The main comparative analyses were designed to investigate the effects of the program on participants, and specifically attribute any observed differences to participation in EAPSI. Thus, rigorous quasi-experimental impact analyses compared the outcomes of fellows to those of unfunded applicants, using pre-award characteristics of applicants to mitigate the potential threat of selection bias. A secondary set of comparative analyses between EAPSI applicants (and fellows) to a nationally representative sample of STEM doctorates from the Survey of Doctoral Recipients (SDR) was used to situate the outcomes of EAPSI program participants and applicants within the national S&E context.

This study was designed to evaluate the extent to which NSF's EAPSI program introduces U.S. graduate students to foreign research setting and helps initiate scientific relationships that enable future collaboration with foreign scientists.

2.1 Data Sources

Data for the evaluation were drawn from extant program records. In addition, surveys were administered to program applicants (both those who received EAPSI fellowships and those who did not), EAPSI foreign hosts, and EAPSI graduate advisors. Telephone interviews with EAPSI managers at foreign counterpart agencies were also conducted. Details for each source are provided below.

2.1.1 Extant Data

Extant data came from NSF's administrative records on applicants from the Survey of Doctoral Recipients (SDR) and the National Survey of Recent College Graduates (NSRCG). NSF's administrative records on applicants were used to construct the study sample. Existing national data from the SDR and from NSRCG were used to compare the characteristics and outcomes of the EAPSI applicants and awardees to the national samples with the similar degrees in the STEM fields.

2.1.2 Primary Data

The core data for the evaluation were gathered through online surveys—completed from January to March, 2011—of EAPSI applicants, hosts and graduate advisors. The surveys gathered information about experiences prior to, during, and after the EAPSI program. The EAPSI applicant survey had some modules that were specific to either unfunded applicants or EAPSI fellows. Copies of this survey, the EAPSI foreign host survey and EAPSI graduate advisors survey are included in Appendix E.

Telephone interviews were also conducted in February and March 2011 with EAPSI host site representatives—individuals who were involved in the management and organization of EAPSI in

each of the host locations. These individuals play an important role in the implementation of EAPSI and their perspectives on the program were important to document. Interview respondents included two groups. The first was agency officials who worked in the foreign agencies that oversee the EAPSI program (the Australian Academy of Science, Chinese Ministry of Science and Technology, Japan Society for the Promotion of Science, Korea Science and Engineering Foundation, Royal Society of New Zealand, National Research Foundation of Singapore, and National Science Council of Taiwan). The second group included program managers responsible for running the EAPSI program in each of the locations (the EAPSI program in Australia, Summer Institute in China, the Summer Program in Japan, Korea Summer Institute Program, EAPSI program in New Zealand, EAPSI summer program in Singapore, and Summer Institute in Taiwan). In two locations, a single individual served as both the agency official and the program manager.

2.2 Study Sample

The target populations for the study included all individuals who had applied to the EAPSI program to conduct fellowships during the 2000 through 2009 summers, fellows' graduate advisors, and the research scientists who served as foreign hosts during this period. These samples are described below.

EAPSI fellows and unfunded applicants. All individuals who applied to the EAPSI program to conduct fellowships during the 2000 through 2009 summers were included in the EAPSI study.[27] Some individuals applied to the program multiple times, but for the purposes of the study they were given a single status as follows: the applicants who had ever received a fellowship were considered awarded and the applicants who never received a fellowship were considered unfunded. If individuals received more than one award, they were included in the study for their most recent award.

Exhibit 2.1 shows the sample size and response rate for the applicant survey, which included individuals who applied to conduct fellowships during the 2000 through 2009 summers. The universe of study-eligible applicants included 1,298 and 811 unfunded applicants (total n=2,109 applicants). Thirty-five applicants (15 awardees and 20 non-awardees) were not eligible for the study and were excluded from the sampling frame.[28] Eliminating these applicants reduced the eligible sample to 2,074 applicants (1,283 awardees and 791 non-awardees). The overall response rate for the applicant survey was 63 percent. The response rate for the awardees was 73 percent (n=938) and for unfunded applicants 46 percent (n=365).

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[27] A previous study of the program, conducted by Westat in 2002, examined the fellowship experiences and outcomes of participants in the Japan programs between 1988 and 1999. Butler, P. Glover, D., Miyaoka, A., Bennett-Harper, S., & Sproul, F. 2002. *Evaluation of the National Science Foundation's Japan Programs*. Westat.

[28] Individuals were excluded for one of the following reasons: individual was an advisor not an applicant; individual was awarded the EAPSI fellowship but declined the award; individual did not recall applying for an EAPSI fellowship; or inspection of data showed that the individual was not eligible to have applied for EAPSI or to participate in the study. Although it is likely that these data were erroneous, it was not possible to verify or correct the information provided.

Exhibit 2.1: Final Sample Size and Response Rates for the EAPSI Applicant Survey

	Overall	Awarded	Unfunded
a. Target Sample[a]	2,109	1,298	811
b. Final Survey Sample[b]	2,074	1,283	791
c. Number of Completed & Partially[c] Completed Surveys	1,326	948	378
d. Number of Completed Surveys	1,303	938	365
Response Rates			
e. Response Rate (d/b)	63%	73%	46%

[a] The target sample was those individuals who applied to conduct fellowships in the 2000 through 2009 summers.
[b] 35 individuals were determined to be ineligible for the EAPSI study.
[c] 23 respondents were classified as 'partial' responders because they had completed less than 15 percent of the questions on the survey.

EAPSI hosts. All hosts of eligible awardees who were identified in NSF records were included in the evaluation, resulting in 1,125 individuals. Eighteen hosts were not eligible for the study and were excluded from the sampling frame.[29] Eliminating these hosts reduced the eligible sample to 1,107 hosts. The overall response rate for the host survey was 61 percent (n=671).

Exhibit 2.2: Final Sample Size and Response Rates for the EAPSI Host Survey

	Overall
a. Target Sample	1,125
b. Final Survey Sample[a]	1,107
c. Number of Completed & Partially Completed Surveys[b]	677
d. Number of Completed Surveys	671
Response Rates	
e. Response Rate (d/b)	61%

[a] 18 individuals were determined ineligible for the EAPSI study.
[b] 6 respondents were classified as 'partial' responders because they had completed less than 20 percent of the questions on the survey.

Advisors of EAPSI fellows[30]. U.S. advisors of EAPSI fellows who provided a reference for the EAPSI application in years starting in 2004 to 2009, and for whom records were available, were included in the study. The universe included 925 study-eligible advisors. Twenty-one advisors were not eligible for the study and were excluded from the sampling frame.[31] Eliminating these advisors reduced the eligible sample to 904 advisors. The overall response rate for the advisor survey was 71 percent (n=644).

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29 Individuals were excluded for one of the following reasons: individual was deceased; individual was hosting an applicant that was awarded the EAPSI fellowship but had declined the award; individual reported not hosting an EAPSI fellow; or inspection of data showed that the individual was not eligible to participate in the study. Although it is likely that these data were erroneous, it was not possible to verify or correct the information provided.

30 EAPSI applicants were not required to provide the names of advisors prior to 2004.

31 Individuals were excluded for one of the following reasons: individual was not the awardees' advisor; individual was deceased; individual was the advisor to an applicant that was awarded the EAPSI fellowship but had declined the award; or inspection of data showed that the individual was not eligible to participate in the study. Although it is likely that these data were erroneous, it was not possible to verify or correct the information provided.

Exhibit 2.3: Final Sample Size and Response Rates for the EAPSI Advisor Survey

	Overall
a. Target Sample	925
b. Final Survey Sample[a]	904
c. Number of Completed Surveys[b]	644
Response Rates	
d. Response Rate (c/b)	71%

[a] 21 individuals were determined ineligible for the EAPSI study.
[b] There were no partially (less than 20 percent) surveys from this respondent group.

EAPSI host site representatives (agency officials and program managers). For each EAPSI host location, NSF identified one or two individuals for interviews —typically one agency official and one program manager—who were most familiar with the EAPSI program. In some host locations a single individual served in both roles. Interviews with ten host site representatives were conducted between February and March, 2011. Eleven potential respondents were invited, and a total of ten representatives, at least one individual from each host location, were interviewed by the research team.

2.3 Non-Response

An initial step in the analysis was to explore the consequences of survey non-response, which could lead to bias if the awarded or unfunded applicants who did not participate in the study would have given systematically different responses to the survey than the individuals who participated in the survey. Two types of non-response were investigated: unit non-response, where no survey was completed; and item non-response, where individual items of an otherwise completed survey were missing.

2.3.1 Unit Non-Response

To address unit non-response for the applicant survey, information from NSF program records was used to estimate the probability that a person would respond to the survey, as a function of baseline characteristics that were available (e.g. proposal score, cohort year, gender). These probabilities were used to create weights that were then used to adjust estimates to alleviate the potential bias[32] due to non-response. This method is described in more detail in Appendix B. It was not possible to conduct a non-response bias analysis for the host and advisor samples, as no appropriate extant data were available. Hence findings described in this report refer only to the survey respondents, and not to all EAPSI hosts or advisors.

2.3.2 Item Non-Response

Item non-response refers to information missing on one or more specific questions in an otherwise completed survey. Since the amount of missing data on an individual item was modest (less than 5 percent) across all returned surveys, it was assumed that data on an item were missing at random.

[32] Note that a large non-response rate does not necessarily create bias. For example, if the non-respondents were similar across the awardees and non-awardees, then the impact estimate would not be biased necessarily; rather, any effect of the program could not be generalized to the non-respondents (i.e. it would create an external validity problem but not necessarily an internal validity issue).

Statistics on missing data are presented in all exhibits in this report. Where appropriate, the study imputed missing covariate values; outcome variables were not imputed (for more details on item non-response analysis see Appendix B).

2.4 Analyses

A series of analyses were conducted to answer the descriptive, comparative, and impact study questions, as described below.

2.4.1 Descriptive Analyses

Most of the research questions were addressed through the use of simple descriptive statistics such as means and percentages, as well as cross-tabulations to illustrate patterns of responses for groups, or the distribution across subgroups of interest. In general, categorical variables were summarized in terms of the percentage of respondents who indicated a particular response, and continuous outcomes were presented in terms of means. All exhibits include information on the total number of respondents on which percentages or means were computed as well as information on item non-response. Estimates were adjusted using weights to account for unit non-response (to mitigate any potential bias), so that parameter estimates are representative of the EAPSI program as a whole.

The qualitative data from open-ended survey questions, for example survey items that asked respondents to describe their individual experiences and perceptions, were examined for common themes and standard coding techniques were applied, where appropriate. These responses provide detailed examples of individual experiences, but are not generalizable, because it is not possible to tell to what extent the view described is shared by others.[33] Specifically, those who chose to write an open-ended response may have systematically different views than those who chose to leave such items blank (for example, be extremely satisfied or unsatisfied with the experience). Responses to survey items that included an "other, please specify" option were coded by the study team for classification into one of the existing response options, whenever possible.

The qualitative data from the interviews were examined across respondents. Coding started with *a priori* themes, but was iterative as additional themes, which emerged during the initial coding, were then applied across all cases as appropriate. The analysis of the interview data explored meaningful patterns of similarities and differences, such as the level and nature of host country involvement, satisfaction with the fellows and the program, and program-related challenges.

2.4.2 Impact Analyses

The evaluation was designed to answer the following research questions about the impact of the EAPSI award on participants:

- Do fellows' international collaborations and other international activities differ from those of unfunded applicants in frequency, length, or type of activities?

[33] The spelling of words in open-ended comments provided by respondents and presented as quotes in this report were corrected where necessary.

- What are the fellows' post-award career activities and job characteristics? How do these compare to unfunded applicants and the national samples?

The goal of the impact component of the evaluation was to estimate the effect of EAPSI on its participants. If EAPSI brings about changes in its participants, then these individuals should have different outcomes, post-participation, than they would have had in the absence of program participation. Although a random assignment study would have allowed a more rigorous test of the causal impact of the EAPSI award on its recipients, this design was not feasible since awardees had already been selected based on the merits of their EAPSI proposal. Instead, a rigorous quasi-experimental design was used to compare outcomes for EAPSI awardees and non-awardees. The primary threat to the validity of a quasi-experimental design comes from selection bias, namely, the possibility that pre-existing differences between awarded and unfunded applicants, rather than the EAPSI award itself, are responsible for observed differences in outcomes between the two groups.

To reduce the risks associated with selection bias, the study incorporated propensity score analysis (PSA) to construct groups of awardees and non-awardees that were statistically similar across a number of pre-existing characteristics (i.e., gender, prior international experience, etc.).[34] Subsequent impact models incorporated the results of the PSA. These methods are described in more detail in Appendix C.

For each outcome, the impact of EAPSI was estimated for a matched group of awarded and unfunded applicants, controlling for number of years since EAPSI application, under-represented minority status, gender, and where applicable, the number of pre-award publications and field of study. Exhibits display the adjusted (estimated) means for awarded and unfunded applicants, the estimated impact, the standard error, and the p-value. For model specifications and standard error calculations, see Appendix C.

It is important to note that the findings described here result from a quasi-experimental analysis that incorporates statistical controls. Although the propensity score analysis is used to control for pre-existing characteristics along which awarded and unfunded applicants may have differed, there is always a chance that some unmeasured preexisting characteristic, rather than the EAPSI award itself, could be responsible for any difference in outcomes between these two groups.

2.4.3 Comparative Benchmarking

For this study, the primary comparison group for EAPSI fellows is a propensity-score matched sample of unfunded EAPSI applicants. The Survey of Doctoral Recipients (SDR) and National Survey

[34] PSA is a common quasi-experimental design approach that has been shown to produce unbiased estimates of program effects. See for example Rosenbaum, P., & Rubin, D. 1984. Reducing bias in observational studies using subclassification on the propensity score. *Journal of the American Statistical Association*, 79(387), 516-524; Heckman, J., Ichimura, H., Smith, J., & Todd, P., Characterizing selection bias using experimental data. available from http://www.irp.wisc.edu/initiatives/trainedu/igrfp/readings04/Heckman_Characterizing_selection_bias.pdf; Cook, T., Shadish, W. and Wong, V. 2008. Three conditions under which experiments and observational studies produce comparable causal estimates: New findings from within-study comparisons, *Journal of Policy Analysis and Management*, 27(4), 724-750.

of Recent College Graduates (NSRCG) respondents were used as a *secondary* comparison group to benchmark fellows' and all applicants' outcomes on specific indicators compared to national averages. The methods used for these analyses are described in more detail in Appendix D.

Data from the 2006 and 2008 SDR were used for comparisons with: EAPSI fellows and all applicants whose highest degrees were a doctorate. Data from the 2006 and 2008 NSRCG were used for comparisons with EAPSI fellows and all applicants whose highest degrees were a master's. Comparisons were made for employment and international collaboration indicators.

3 Characteristics of EAPSI Applicants and Hosts

This chapter presents information on the EAPSI application process, trends in program applications and awards, and characteristics of awarded and unfunded applicants and hosts, as well as their motivations for applying for and participating in EAPSI. Data for this chapter come from NSF's program records and web surveys of applicants, hosts, and fellows' graduate advisors, as well as from interviews conducted with the EAPSI host site representatives—the agency officials and program managers most familiar with the EAPSI program in each of the host locations.

Specifically, this chapter answers the following questions:

- What are the characteristics of people who apply for and participate in the EAPSI program?
- What motivates individuals to apply for and participate in the program?

3.1 Key Findings

- The EAPSI program awarded the fellowship to just over half (56 percent) of the applicants from 2002 to 2009, totaling 1,126 fellowships. The number of applications received by the program in a given year exhibited an upward trend coinciding with the addition of new host sites to the program.[35]
- Applicants most commonly applied to EAPSI to enhance their skills or knowledge as a researcher (82 percent), to learn about the culture, history, and geography of another country (77 percent), and to conduct research with a specific person or at a specific institution (70 percent).
- A large majority of graduate advisors reported that they encouraged their students to apply for the fellowship (90 percent). Of these, most viewed the program as one that would help their students' future academic or professional career (89 percent), and was important for them to gain an international perspective (88 percent).
- More applicants were pursuing a doctoral degree than a master's degree at the time of application (76 versus 24 percent). The three most common fields of study for applicants were biological, agricultural, or environmental sciences (28 percent), engineering (27 percent), and physical sciences (21 percent).
- Graduate advisors typically assist their students with the EAPSI application process. As an example, many fellows reported that they received a letter of recommendation from their advisor (87 percent).
- Host researchers most commonly reported that they agreed to serve as a host in the program because of a shared interest in the prospective fellow's research project (64 percent), an interest in creating an international environment in their research group (59 percent), and to establish or maintain collaboration with a U.S. researcher (57 percent).

[35] Program information did not contain information on unfunded applicants for 2000 and 2001, so these years were not included in this piece of the analysis.

- The EAPSI program tends to award fellowships to students who would be establishing new relationships with their host researcher. Only 15 percent of hosts reported that they knew their prospective fellow prior to him/her applying. Almost half (45 percent) of the hosts, however, knew the graduate advisor of the prospective fellow.

3.2 Applications and Awards

3.2.1 Trends in Program Applications and Awards

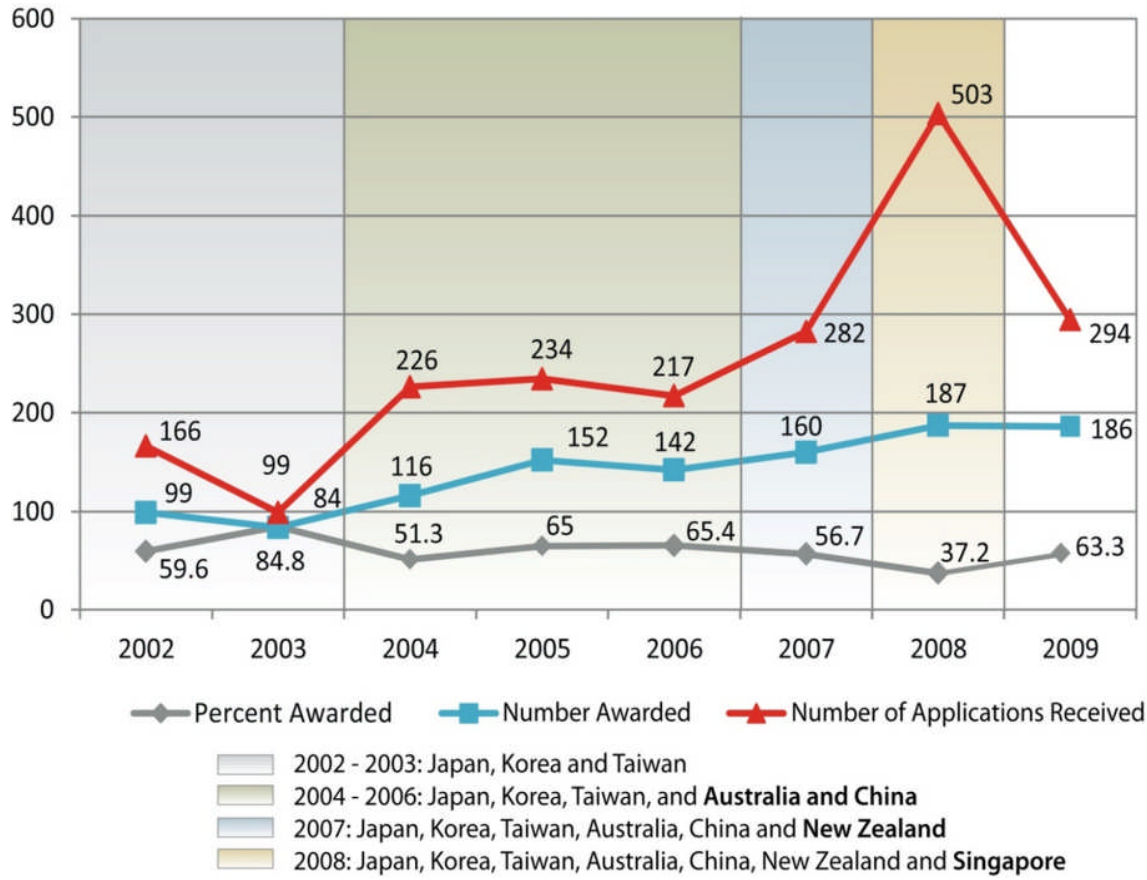
According to NSF's program data, the EAPSI program received 2,021 completed applications from 2002 to 2009.[36] Because EAPSI is funded and managed in partnership with the participating organizations or agencies in the host countries, the final slate of selected participants is agreed to by both NSF and the foreign agencies. Exhibit 3.1 shows, for the years from 2002 to 2009, the number of applications received, the number of fellowships awarded, and the resulting percent of applications that were successful.

The number of applications received in a single year averaged 253 per year, ranging from 99 to 503. The increasing number of applications received coincides with the addition of new host countries to the EAPSI program. In 2002 and 2003, when the participating host sites were only Japan, Korea, and Taiwan, the average annual number of applications received was 88. Australia and China established EAPSI programs in 2004, bringing the number of locations to five, and the average number of applications grew in the next two years (to 226 in 2004, 234 in 2005, and 217 in 2006). Further increases in applicants were seen in 2007 when New Zealand joined the program and again in 2008 when Singapore joined. The number of applications for 2003 is likely a subset of the total number of applications received because the program data available for 2003 was incomplete in the program files available to the evaluation team.

From 2002 to 2009, 56 percent of applicants to EAPSI were awarded the fellowship, for a total of 1,126 fellowships; the annual award rate ranged between 37 and 85 percent. The award rate in any given year depends on the number of applications as well as the number of fellowships available in a given year, which varies based on the number of participating host countries, level of funding for the program, and the number of fellowship slots per host site in a given year. Applications from 2000 and 2001 are not included in these analyses because program records for these years were limited to only the fellows, and did not include records of unfunded applicants.

[36] Although individuals who applied in 2000 and 2001 are included in the study's sampling frame, NSF's program data for this time period were limited to only the fellows, so these two years have been excluded from analyses of trends in program applications and awards. The number of applications received in 2003 and 2009 are likely to contain only a subset of the total number of applications received in those years; program data available for that year appears to be incomplete at the time data were collected for the study.

Exhibit 3.1: EAPSI Applications Received and Awarded, 2002-2009



NOTES: Data from 2000 and 2001 are not included in these analyses because program data for these years was limited to only the fellows, and did not include records of unfunded applicants. Numbers for 2003 are likely understated because program records were incomplete in the files available for the evaluation
SOURCE: NSF Extant Program Data

3.2.2 Applicants' Reasons for Applying

Applicants' stated reasons for applying to the fellowship offer insight into the elements of the EAPSI program that were most appealing to graduate students (Exhibit 3.2). Most commonly, the applicants wanted to enhance their skills or knowledge as a researcher (82 percent), to learn about the culture, history, and geography of another country (77 percent), and to conduct research with a specific person or at a specific institution (70 percent). For the most part, awarded and unfunded applicants had similar motivations for applying; however, a few differences are worth noting. Awarded applicants' reasons for applying more often included to learn about culture, history and/or geography of another place (82 versus 66 percent) and to learn another language (30 versus 14 percent) than unfunded applicants.

Exhibit 3.2: Reasons for Applying

	All Applicants	Awarded	Unfunded
To enhance my skills or knowledge as a researcher	81.6%	81.0%	82.7%
To learn about the culture, history, and/or geography of another place	76.5	81.5	66.3
To conduct research with a specific person or at a specific institution	69.9	68.9	72.1
To collaborate with a foreign scientist	68.2	69.4	65.6
To travel outside of the U.S.	66.5	67.6	64.2
To understand what research in my field was like outside the U.S.	65.1	65.3	64.7
To enhance my resume as a future job candidate	60.1	60.1	60.1
To make progress towards earning my graduate degree	35.7	35.9	35.3
To access resources for research that I could not find in the U.S.	29.9	29.9	29.7
To learn another language	24.5	29.5	14.1
For family reasons	2.6	2.6	2.6
Other reasons not listed above	3.6	3.2	4.2

NOTES: N=1302 (938 Awarded, 364 Unfunded Applicants), Missing=1 (Unfunded Applicant). Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Item B1

Graduate advisors of awarded applicants provided additional insight into the perceived value of the EAPSI program. Ninety percent of the advisors who responded to the survey reported that they encouraged their students to apply for the fellowship.[37] When asked why, most believed it would help their students' future academic or professional career (89 percent) and that it was important for them to gain an international perspective (88 percent). More than half of the advisors also encouraged their students to participate believing it would foster more international collaborations between researchers in the U.S. and abroad (69 percent) and because of their own positive experiences collaborating internationally (68 percent).[38]

This program provides unique opportunities to further scientific and global perspectives. It has huge academic and cultural value to any student who can find academic colleagues in the appropriate countries. (Advisor of EAPSI fellow)

The department has always encouraged international collaboration, even before the EAPSI program. However, this program reinforced the department's goals and encouraged other graduate students to explore international collaboration (Advisor of EAPSI fellow)

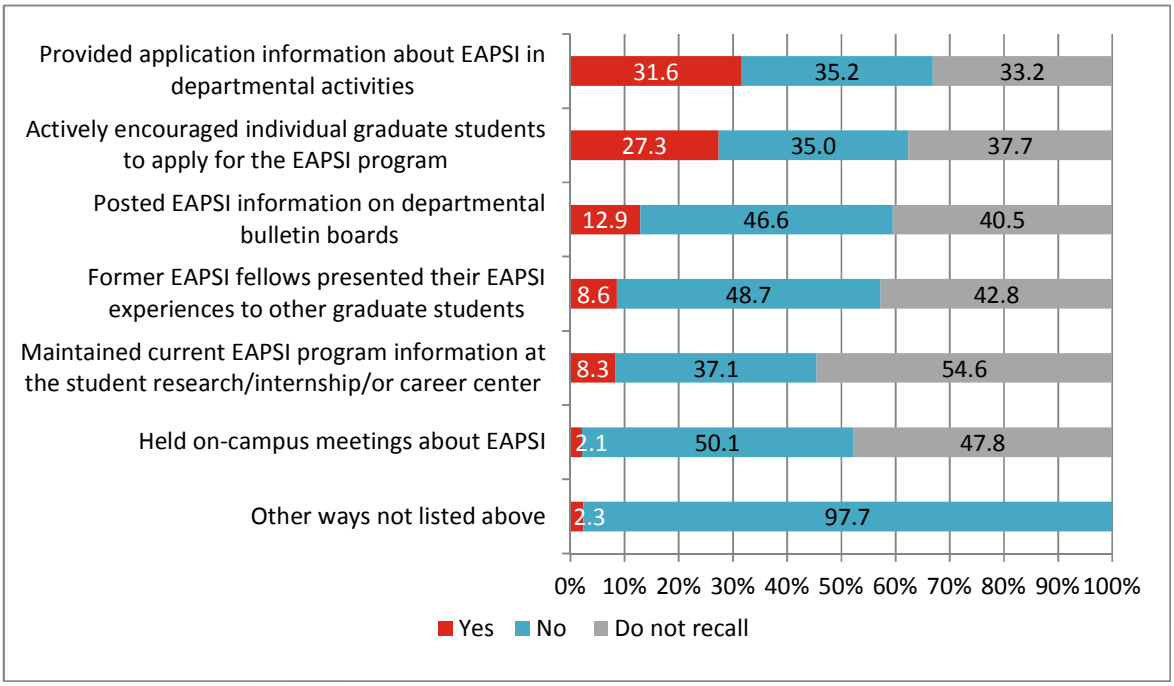
A notable percentage of advisors, however, could not recall if their institution publicized the

[37] No exhibit. N=641, Missing=3 Advisors. *Source: EAPSI Advisor Survey–Item B5.*

[38] No exhibit. N=579, Missing=0 Advisors. This item was only answered by advisors whose response to B5=1 (indicated that they encouraged fellow to apply to EAPSI program). Responses do not sum to 100 because multiple responses were permitted

program in the various ways listed in Exhibit 3.3. However, some of the fellow advisors reported that their institutions provided application information through departments (32 percent) and actively encouraged individual graduate students to apply to the program (27 percent).

Exhibit 3.3: Institutional Efforts to Publicize EAPSI Program as Reported by Advisors



NOTES: N=608 to 641, Missing 3 to 36 Advisors.
SOURCE: EAPSI Advisor Survey- Item B2

Advisors also provided information that characterized the applicants' home departments' attitudes towards international collaboration at the time they enrolled in EAPSI (Exhibit 3.4). Roughly three-quarters of advisors characterized the department as one that encouraged international collaborations (74 percent) and had hosted foreign researchers (73 percent). However, fewer described the department as promoting international fellowship research opportunities (37 percent) or rewarding or funding faculty for their international collaborations (22 percent).

Exhibit 3.4: Characteristics of Fellows' Graduate Department as Reported by Advisors

	Advisors
Department encouraged international collaborations	74.0%
Department hosted foreign post-docs and faculty visiting the institution for research-related purposes	72.9
Department promoted (i.e., advertised) fellowships for graduate students or postdocs to conduct research in a foreign country	36.8
Faculty in this department were rewarded for developing international collaborations	22.4
Department provided financial support to faculty pursuing international collaborations	9.7
Do not recall	3.0
None of the above	9.1

NOTES: N=639, Missing=5 Advisors.
SOURCE: EAPSI Advisor Survey–Item E1

3.3 Characteristics of Applicants

The EAPSI program targets U.S. citizens or permanent residents who are enrolled in research oriented master's or PhD degree programs, in science and engineering research and education fields supported by NSF. As such, EAPSI applicants represent a variety of demographic and disciplinary backgrounds and come from institutions across the U.S.

3.3.1 Applicants' Demographic Characteristics

Demographic characteristics of awarded and unfunded applicants were similar (Exhibit 3.5). In both groups, more individuals were male (55 percent) than female (45 percent). The majority of respondents identified their race as White (75 percent). The remaining respondents self-identified as Asian (17 percent), multi-racial (4 percent), Black or African American (3 percent), American Indian or Alaskan Native (less than 1 percent), or Native Hawaiian or Pacific Islander (less than 1 percent).

Exhibit 3.5: Applicants' Demographic Characteristics

	All Applicants	Awarded	Unfunded
Gender			
Female	44.9%	43.7%	47.4%
Male	55.1	56.3	52.6
Race			
White	74.6%	74.4%	75.2%
Asian	17.1	17.9	15.3
Multiracial (two or more races)	4.3	4.8	3.4
Black or African American	3.3	2.3	5.2
Native Hawaiian or other Pacific Islander	0.4	0.2	0.9
American Indian or Alaska Native	0.3	0.5	0.0
Ethnicity			
Non-Hispanic	94.8%	96.1%	92.3%
Hispanic	5.2	3.9	7.7
Disability Status			
Disabled	1.4%	0.8%	2.5%

NOTES: All Applicants: N=1243 to 1303, Missing=0 to 60; Awarded Applicants: N=900 to 938, Missing=0 to 38; Unfunded Applicants: N=343 to 365, Missing=0 to 22.
SOURCE: EAPSI Applicant Survey–Items G1-G5a, NSF Extant Data

3.3.2 Applicants' Academic Characteristics

Although the EAPSI program provides fellowships to graduate students at both master's and doctoral levels, applicants are more likely to be doctoral students (Exhibit 3.6); three times as many applicants were pursuing doctoral degrees than master's degrees at the time they applied for the fellowship (76 versus 24 percent). The fellows were more likely to be pursuing doctoral degrees than unfunded applicants (79 versus 69 percent).

The EAPSI program invites applications from a range of science and engineering fields. The three most common disciplines of study at the time of application were: biological, agricultural, or environmental sciences (28 percent), engineering (27 percent), and physical sciences (21 percent) (Exhibit 3.6).

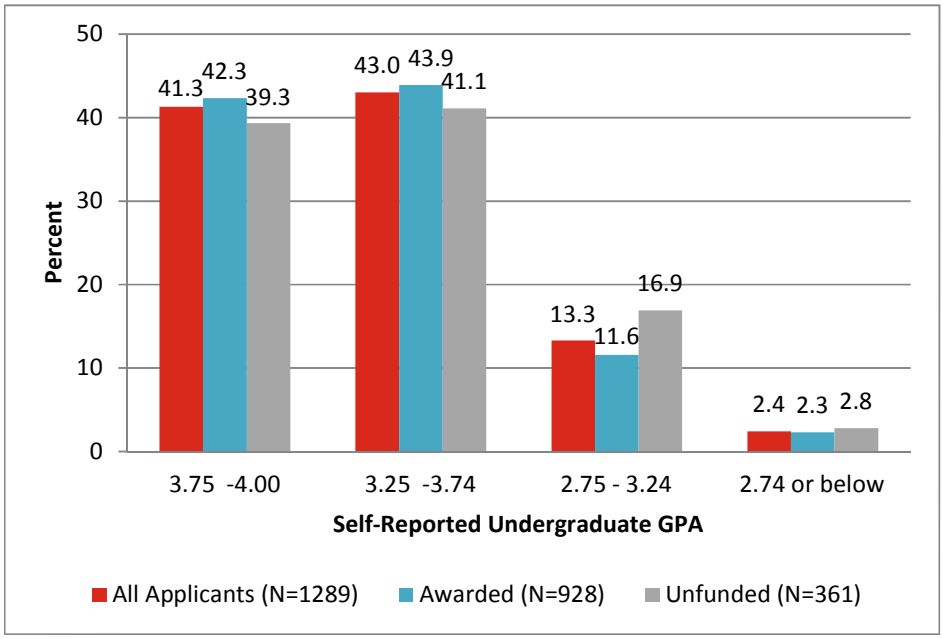
Exhibit 3.6: Degree Type and Discipline of Study at Time of Application

	All Applicants	Awarded	Unfunded
Type of Degree Pursued [a]			
PhD or equivalent	75.9%	79.2%	68.9%
Masters	24.2	20.8	31.1
Discipline of Study [b]			
Biological, agricultural, or environmental sciences	28.1%	27.1%	30.0%
Engineering	26.6	27.4	25.0
Physical sciences	20.5	21.8	17.9
Computer and information sciences, mathematics, or statistics	9.7	10.3	8.6
Psychology and social sciences	9.7	7.8	13.5
Health	5.4	5.6	5.1

[a] N=1301 (938 Awarded, 363 Unfunded Applicants), Missing=2 Unfunded Applicants.. PhD or equivalent includes EdD, MD, joint MD/PhD, PsyD, and ScD.
[b] N=1303 (938 Awarded, 365 Unfunded Applicants), Missing=0.
SOURCE: EAPSI Applicant Survey–Items A5 and A7

EAPSI applicants tended to have strong academic backgrounds. The large majority of respondents (84percent) reported a GPA of 3.25 to 4.00, equivalent to a B+ or higher (Exhibit 3.7).

Exhibit 3.7: Self-Reported Undergraduate GPA



NOTES: N=1289 (928 Awarded, 361 Unfunded Applicants), Missing=14 (10 Awarded, 4 Unfunded Applicants. Missing includes 7 responses of "Did not receive grades."
SOURCE: EAPSI Applicant Survey–Item C1

Further, prior to applying to EAPSI, 23 percent of applicants had received a nationally competitive fellowship to support their graduate studies; more awarded than unfunded applicants had

fellowships (26 versus 18 percent).[39] EAPSI applicants also reported an average of 3.7 publications which included peer-reviewed conference papers, peer-reviewed journal articles and book chapters at the time of application; 8 percent of these included a foreign collaborator (Exhibit 3.8). Additional ways in which EAPSI applicants engaged in international collaborations are discussed in the next section.

Exhibit 3.8. EAPSI Applicants' Publications and Patents at Time of Application

	All Applicants	Awarded	Unfunded
Mean number produced	**Mean N**	**Mean N**	**Mean N**
Publications	3.7	3.7	3.8
Patents	0.1	0.1	0.1
Percent produced with a foreign collaborator	**Mean %**	**Mean %**	**Mean %**
Mean percent of publications	8.3	8.7	7.2
Mean percent of patents	0.4	0.6	0

NOTES: All Applicants: N=1115 to 1136, Missing=188 to 167 ; Awarded Applicants: N=811 to 830, Missing=126 to 108; Unfunded Applicants: N=306 to 303, Missing=62 to 59.
SOURCES: EAPSI Applicant Survey–Item C8

3.4 Application Decisions and Support

Application materials are typically due in November or December. In addition to an application form, applicants are to include a biographical sketch, a project description that addresses the intellectual merit and broader impacts of their proposed research and expected benefits of working with the host, letters of reference, and undergraduate and graduate transcripts.

3.4.1 Selection of Host Researchers / Host Institutions

The EAPSI program gives students the opportunity to identify a specific host researcher and institution of their choice within a wide variety of institutions and geographic locations. Applicants may approach individuals at almost any academic or research institution in one of the participating EAPSI locations to seek acceptance and placement.

Applicants must specify at least one potential host location and corresponding host researcher and institution, but may include additional choices in order of preference. In 2008, an application requirement was added whereby applicants must obtain a preliminary invitation or acceptance from their top choice host researcher and include that correspondence with their application documents (prior to 2008, applicants were strongly encouraged to submit this type of correspondence). This correspondence is intended to provide evidence of the host's willingness to work with the applicant and a mutual commitment to the proposed research project. Over half of the applicants (65 percent) reported that they submitted evidence of support (e.g., a letter or an email message) from their proposed host scientist. A higher proportion of awarded than unfunded applicants reported

[39] No exhibit. N=1286 (929 Awarded, 357 Unfunded Applicants), Missing=17 (9 Awarded, 8 Unfunded Applicants). Nationally competitive fellowships were defined as unrestricted fellowships granted by a federal agency, private foundation, or similar organization directly to an individual graduate student (or graduate school applicant) for use at any graduate institution of his/her choosing. *Source: EAPSI Applicant Survey–Item C9.*

that they provided this type of letter or other communications (68 versus 58 percent) when applying; 23 percent of all applicants could not recall if their application materials included any correspondence with their proposed host.[40]

Hosts of awarded applicants were asked about the ease of providing the supporting letter for their prospective fellow's application to NSF and a majority of respondents indicated that it was easy (74 percent); just 10 percent reported that it was somewhat or very difficult to provide the materials, and 16 percent responded that they did not provide these materials.[41]

3.4.2 Role of Advisors in Application

As graduate students, EAPSI applicants are still developing as independent researchers and their mentors are likely to play an important role in the opportunities they choose to pursue. Only 2 percent of respondents reported that their advisor opposed their decision to apply. Indeed, advisors and other mentors played important roles in the EAPSI application (no exhibit).

A large proportion of applicants (87 percent) verified that their graduate advisor or other mentor provided a letter of recommendation, although awarded applicants were slightly more likely than unfunded applicants to report such support (90 versus 81 percent, Exhibit 3.9). Just over half of the applicants (53 percent) indicated that their advisor or mentor provided feedback on their research project proposal. Further, in preparing their EAPSI application, applicants indicated that their advisor or mentor recommended them to a colleague at the host institution (40 percent) and suggested a potential host institution (37 percent). Awarded applicants were more likely than unfunded applicants to receive this type of assistance from their advisor or mentor. Specifically, 44 percent of awarded versus 31 percent of unfunded applicants were recommended to a colleague at the host institution and 42 percent versus 28 percent, respectively, received suggestions for a host institution from their advisor.

> *I think EAPSI offers a valuable opportunity for graduate students to obtain experience (both research experience and other experiences abroad). At its most effective [sic], it adds a significant new dimension to the dissertation research of participating students.*
> (Advisor of EAPSI fellow)

[40] No exhibit. N=1296 (935 Awarded, 361 Unfunded Applicants), Missing=7 (3 Awarded, 4 Unfunded Applicants). *Source: EAPSI Applicant Survey–Item C7a.*

[41] No exhibit. N=657, Missing=8 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). *Source: EAPSI Host Survey–Item B7.*

Exhibit 3.9: Support Received by Applicants from Advisor or Other Mentor

	All Applicants (N=1302)	Awarded (N=938)	Unfunded (N=363)
Provided a letter of recommendation to NSF	87.2%	90.1%	81.2%
Provided feedback on my project proposal	52.9	53.3	52.0
Recommended me to a colleague at the host institution	39.6	43.8	30.7
Suggested a host institution	37.2	41.5	28.2
Discussed language and cultural aspects of the host site	12.0	15.4	5.0
Other reasons not listed above	2.3	2.5	1.8
None	6.2	4.4	10.0

NOTES: N=1302 (938 Awarded, 364 Unfunded Applicants), Missing=1 Unfunded Applicant. Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Item B5

Graduate advisors' responses were consistent with those of the fellows.[42] A majority of the advisors recalled providing a letter of recommendation to NSF (89 percent), letter of recommendation to the host researcher (70 percent), and general application preparation support (68 percent). Further, advisors confirmed supporting their graduate students in selecting the host researcher or institution for the fellowship: 65 percent suggested a researcher or institution and 53 percent helped contacting the hosts (Exhibit 3.10).

> *It is a great opportunity for students to learn new techniques, develop new collaborations, learn about science in a different country, and experience life in a different culture—all wonderful aspects of the program!* (Advisor of EAPSI fellow)

Exhibit 3.10: Support Provided by Graduate Advisors

	Percent of Advisors
Provided a letter of recommendation to NSF	88.8
Provided a letter of recommendation to EAPSI host	70.1
Provided support with application preparation	68.0
Located host institution or host researcher	65.2
Contacted host institution	53.4
Other	1.2

NOTES: N=618 to 640, Missing=4 to 26 Advisors. Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Advisor Survey–Item B3

[42] The graduate advisors surveyed for this study were limited to those of awarded applicants (fellows), thus their responses do not represent advisors of unfunded applicants.

3.5 Applicants' Prior International Experiences and Relationships

EAPSI offers international opportunities that most applicants have not previously experienced. This section describes the prior international experiences of participants.

3.5.1 Prior Academic and Travel Experiences Outside the U.S.

The majority of EAPSI applicants did not have extensive academic and travel experiences outside the U.S. at the time of application (Exhibit 3.11). Only 36 percent of applicants participated in study abroad programs as undergraduates or graduate students, and 18 percent had attended elementary or secondary school outside the U.S. Around one-third had lived outside the U.S. for six months or longer (35 percent) or visited or lived in one of the seven EAPSI host locations for a month or longer (30 percent). Less than a quarter of applicants (22 percent) reported that they had attended a research conference outside the U.S.

Exhibit 3.11: Prior Academic and Travel Experiences Outside the U.S.

	All Applicants	Awarded	Unfunded
Prior study abroad experience (semester or longer)	36.1%	34.7%	39.2%
Lived outside the U. S. (6 months or longer)	35.0	34.2	36.8
Visited or lived in an EAPSI host location (one month or longer) [c]	29.6	28.0	33.0
Attended or presented scholarly work at a research conference outside the U.S.	22.0	21.1	24.0
Attended elementary or secondary school outside the U.S.	17.6	16.5	19.8

NOTES: All Applicants: N=1294 to 1301, Missing=2 to 5 ; Awarded Applicants: N=935 to 937, Missing=1 to 3; Unfunded Applicants: N=359 to 364, Missing=1 to 6 .Percentages do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Items C2a, C2b, C3 and C6.

3.5.2 Prior Relationships with Individuals and Institutions Based Outside the U.S.

One of the primary goals of EAPSI is to initiate professional relationships that might seed future productive collaborations. Few applicants had these professional relationships prior to application to the program (Exhibit 3.12). Just over one-quarter had collaborated on research with someone based outside the U.S. (27 percent), and fewer had participated on a research team with a visiting foreign scientist (19 percent), or published a research paper or book with someone based outside the U.S (9 percent). Awarded applicants were slightly more likely than unfunded applicants to work on a project with a visiting foreign scientist (21 versus 15 percent). Furthermore, most of the applicant respondents (86 percent) had no prior experience collaborating with their proposed host scientist or someone else at the host institution to which they applied.

About one-third of applications appear to build on an existing collaboration between the prospective host and a faculty member at the applicants' U.S. institution (34 percent). This type of pre-existing collaboration was more likely to exist for applicants who received EAPSI awards than for unfunded applicants (38 versus 25 percent). The fellows were also more likely to know another graduate student who had been to the host institution (12 versus 7 percent).

Exhibit 3.12: Prior Relationships with Individuals and Institutions Outside the U.S.

	All Applicants	Awarded	Unfunded
Prior research experiences with foreign scientists			
Collaborated on research with someone based in a country outside the U.S.	27.0%	27.0%	26.8%
Participated on a research team with a visiting foreign scientist	18.7	20.7	14.6
Published research with someone based in a country outside the U.S.	8.9	9.1	8.4
Prior collaboration with proposed host scientist or someone else at proposed institution			
No prior collaboration	86.2%	85.3%	88.2%
Collaborated with proposed host scientist	11.6	12.9	8.7
Collaborated with someone else at proposed host institution	2.2	1.8	3.1
Prior connection between graduate institution and proposed host institution			
Faculty member was / had collaborated with someone at the host institution	33.9%	38.3%	24.6%
Worked with a colleague who had completed an EAPSI fellowship	13.0	13.7	11.8
Other graduate students had been to the host institution	10.0	11.6	6.9
University had an existing collaboration or exchange program with the host institution	5.8	5.5	6.4

NOTES: All Applicants: N=1290-1300, Missing=3-13 ; Awarded Applicants: N=931-937, Missing=1-7 ; Unfunded Applicants: N=359-363, Missing=2-6 . Percentages do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Items C6, C7b, C7c

Responses from graduate advisors confirmed that some fellowships built on existing relationships. Among the advisors who responded to the survey, 36 percent reported having a prior collaboration with their student's EAPSI host, 14 percent had collaborated with someone other than the EAPSI host at the host institution, and 11 percent had previously visited the student's host institution for professional purposes.[43]

3.6 Hosts

3.6.1 Eligibility

Information from the interviews with EAPSI agency officials and program managers in the foreign locations suggested that each host site sets its own requirements for host researchers and institutions. In general, eligibility to serve as a host and host institution is fairly broad. China and Singapore tend to have more strict eligibility requirements than Australia and New Zealand. Hosts who are willing to accept an EAPSI fellow are advised to get to know the prospective fellow during the application process. This involves reviewing and discussing their proposed research project. Since 2008, hosts are required to provide the prospective fellow with a letter of acceptance stating their intent and ability to serve as a host and agree to provide the fellow with any necessary laboratory facilities and supplies.

[43] No exhibit. N=644, Missing=0 Advisors. *Source: EAPSI Advisor Survey–Item B4.*

3.6.2 Reasons for Hosting an EAPSI Fellow

In most locations, hosts are not provided with funding to host an EAPSI fellow, thus, their decision to serve as a host is driven by other factors (Exhibit 3.13). The most frequently reported reason for hosting an EAPSI fellow was a shared interest in the research project (64 percent). More than half of the respondents wanted to create an international environment in their research group (59 percent) and to establish/maintain collaboration with a U.S. researcher (57 percent). Half reported that they decided to serve as a host because they personally knew, knew of, or had previously collaborated with the fellow's graduate advisor, and 13 percent because they knew the student.

The program deepens international friendship, particularly between young researchers. It is one of the rare occasions when graduate students can interact with foreign researchers on daily basis.

Exhibit 3.13: Reasons for Hosting an EAPSI Fellow

	Hosts (N=665)
I was interested in the project proposed by the fellow	63.5%
To create an international environment in my research group	59.2
I was interested in establishing or maintaining collaboration with a U.S. researcher	56.8
I personally knew, knew of, or previously collaborated with the fellow's graduate advisor	50.4
My research area is particularly suitable for international collaboration	36.4
To attract new students/postdocs to my research	32.6
I had a positive experience with another international program	28.1
I personally knew, knew of, or previously collaborated with researchers at the fellow's institution	19.1
To improve the status of my department and/or institution	16.4
To learn new methodologies, approaches, or tools from the fellow	14.7
I had a positive experience with the EAPSI program in the past	14.6
I personally knew, knew of, or previously collaborated with the fellow	13.4
In my field, individuals trained at U.S. graduate institutions are highly sought-after	12.3
Other reasons not listed above	3.2

NOTES: N=665, Missing=0 Hosts.). This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). Responses do not sum to 100 because multiple responses were permitted.
SOURCE: Host Survey–Item B2

Thirty percent of the hosts who responded to the survey did not know the fellow or the fellow's advisor prior to hosting the fellow. Only 15 percent of the hosts who responded to the survey stated that they formerly knew the fellow, slightly less (11 percent) knew both the fellow and the fellow's graduate advisor, yet almost half (45 percent) reported that they knew the fellow's graduate advisor but not the fellow beforehand.[44] Overall, hosts and awarded applicants had similar responses in

[44] No exhibit. N=659, Missing=6 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). *Source: EAPSI Host Survey–Item B6.*

regards to a pre-existing relationship, which indicates that the EAPSI program tended to award fellowships to students who would be establishing new relationships with their host researcher.

3.6.3 Concerns about Hosting an EAPSI Fellow

Hosts were asked about any concerns they had with regards to hosting their EAPSI fellow (Exhibit 3.14). Roughly a third of the respondents did not have any. The most common concern, reported by 54 percent of host respondents, was that the length of EAPSI (8 to 10 weeks) was too short for their fellow's proposed project (Exhibit 3.13).

Exhibit 3.14: Host Concerns about Hosting an EAPSI Fellow

	Hosts (N=665)
The length of EAPSI was too short for the proposed project	54.4%
I was concerned about the fellow's commitment	11.0
I was concerned about integrating this fellow into my group	8.9
I was concerned that I might not benefit from hosting this student	5.0
In my field, individuals trained at U.S. institutions sometimes have gaps in their knowledge, skills, or abilities	2.4
I was concerned about the risks of international collaboration in general	1.8
The fellow's proposed research project was especially risky	1.5
I had a negative experience with other graduate student fellows (not affiliated with EAPSI)	0.8
I had a negative experience with EAPSI in the past	0.5
My research area is not particularly suitable for international collaboration	0.5
Other concerns not listed above	2.6
No concerns selected [a]	35.3

NOTES: N=665, Missing=0 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). Responses do not sum to 100 because multiple responses were permitted.

[a] These include those who did not select any concern, and those who wrote in "none" or "no concerns" in the other option.

SOURCE: Host Survey–Item B3

3.6.4 Prior Academic and Travel Experiences in the U.S.

Nearly all the hosts who responded to the survey (97 percent) indicated that they had visited the U.S. for educational, research or other professional purposes prior to serving as an EAPSI host (Exhibit 3.15). The most frequently cited reason was to attend a conference, workshop, or meeting (74 percent). Half of the hosts had been visiting scientists in the U.S and over one-quarter were postdoctoral fellows (29 percent) and/or attended graduate school (28 percent) in the U.S.

Exhibit 3.15: Host Reasons for Travel to the U.S.

	Hosts (N=665)
Attended a conference, workshop or meeting	74.0%
Served as a visiting scientist	49.9
Held a postdoctoral fellowship	28.9
Attended graduate school	27.8
Held a faculty position	8.7
Attended an undergraduate institution	4.4
Other reasons not listed above	5.1
Did not visit the U.S. for any professional purposes	2.7

NOTES: N=665, Missing=0 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). Responses do not sum to 100 because multiple responses were permitted.
SOURCE: Host Survey–Item B5

4 Fellowship Activities

This chapter describes the EAPSI fellowship from the perspectives of EAPSI fellows, their hosts, the fellows' U.S. advisors, and the managers and officials in the host locations.

Data for this chapter come from extant NSF program records; web surveys of fellows, hosts, and graduate advisors of fellows; and interviews with EAPSI representatives from each of the seven host sites. Statistically significant differences observed between the sites are noted.

Specifically, this chapter addresses the following question:

- What are the program experiences of program participants?

> *It is an incredible, invaluable experience. Science is getting more international all of the time and it is critical that we understand how it is conducted in other countries/cultures. It also helps one really become more understanding of one's foreign colleagues when working at U.S. institutions. It's an educational, incredibly fun adventure!!! What is there not to recommend?* (EAPSI fellow)

4.1 Key Findings

- Various types of support were available to fellows as they transitioned into the research activities in their host site. Fellows reported attending a pre-departure orientation facilitated by NSF (87 percent) and host researchers indicated that they assisted their fellow with getting access to needed facilities (90 percent), arranging their office space (83 percent), and finding them an appropriate research project (75 percent).
- A majority of hosts agreed that that their research interests were well-matched with those of their fellow (82 percent), and that they and the fellow shared similar goals and expectations for the EAPSI experience (60 percent).
- Fellows had the opportunity to work with a range of individuals at the host institution. Hosts most frequently reported that their fellow worked with the host (80 percent), graduate students in the host's research group (66 percent), and other scientists in the host's research group (45 percent).
- In general, a larger proportion of fellows reported that they worked on research activities independently as opposed to equally with their host. Activities most commonly cited by fellows as being worked on equally were interpreting results (37 percent), collecting data or carrying out simulations (33 percent), developing instrumentation (31 percent), and developing ideas or hypotheses (31 percent).
- Overall, fellows were satisfied with their EAPSI research activities and interactions with their host. A majority of fellows reported that they were very satisfied with their host's expertise (81 percent) and the match between their research interests and the host's (63 percent).

- Hosts provided positive reports of their interactions with the fellows. At least 85 percent strongly agreed or agreed that their fellow demonstrated sufficient knowledge and expertise, integrated well with their research group, was hard-working and dedicated, and spent sufficient time working on the project.
- A minority of fellows noted difficulties related to their research activities and host interactions. Among the difficulties cited were not enough guidance from the host (17 percent), and being assigned a role that was less than merited by their skills or knowledge (5 percent). Less than 10 percent of hosts reported specific challenges regarding collaborating on research with their fellow.
- While conducting research in the host site is a primary focus of the program, fellows are encouraged to engage in other professional activities. Fellows most often reported that they visited other institutions (72 percent), networked with colleagues not affiliated with their host institution (64 percent), and gave a presentation or talk (63 percent). Close to 90 percent were satisfied or somewhat satisfied with the professional connections made during their fellowship.
- Nearly all fellows participated in cultural and leisure activities in their host site which included sightseeing (97 percent), exploring the landscape or geography (91 percent), and visiting museums (89 percent).
- Communication or language issues were most frequently cited as difficulties that fellows encountered during their fellowship; however, this varied significantly by host site where a greater number of fellows in primarily non-English speaking host sites experienced these difficulties (28 to 44 percent within these sites) than fellows in primarily English-speaking host sites—New Zealand, Australia, and Singapore (0 to 10 percent within these sites).
- Host site representatives indicated that they were generally satisfied with the level of communication and involvement of NSF in administering the program. Although few suggestions for improving the role of NSF were reported, the most common suggestion was for NSF to establish a reciprocal program whereby students could have opportunities to conduct research in the U.S. alongside American hosts.

4.2 Host Site Placement

NSF and the foreign co-sponsoring organizations work together to finalize host placements and subsequent arrangements for fellows. When applying, applicants are advised that NSF may choose to award them a fellowship, but at a host site other than what they indicated as preferred in their application. Most fellows (95 percent) reported that they received their first choice of host site, although this varied by preferred site, from 100 percent for those who selected Singapore to 79 percent among those who selected Australia.[45]

The distribution of fellows from 2000 to 2009 among the seven host sites reflects, in part, the number of years a site has participated in the EAPSI program and the number of fellowship slots per

[45] No exhibit. N=938, Missing=0 (fellows). *Source: EAPSI Applicant Survey–Item A3*

site (Exhibit 4.1). For example, Singapore, the newest site to establish an EAPSI program, was host to only 3 percent of fellow respondents. Taken as a whole, EAPSI fellows from 2000-2009 were more likely to carry out their fellowship in Japan (48 percent), followed by China (15 percent), and Taiwan (10 percent), the longest participating sites (Exhibit 4.1). Countries joined the EAPSI program at different times during the 2000-2009 period covered by this evaluation. Japan, Korea, and Taiwan were part of the program in 2000. Australia and China joined in 2004, New Zealand in 2007, and Singapore in 2008. Exhibit 4.1 displays the host site placements during these different periods.

Exhibit 4.1: EAPSI Fellows' Placement Site for Active Host Sites from 2000-2009

	2000-2003		2004-2006		2007		2008-09		Overall	
Host Site	%	N	%	N	%	N	%	N	%	N
Japan	79.8%	178	45.1%	130%	36.3%	41	32.8%	100	48.3%	449
Korea	9.0	20	12.2	35	9.7	11	7.2	22	9.5	88
Taiwan	11.2	25	9.7	28	8.0	9	11.5	35	10.4	97
Australia			15.3	44	13.3	15	10.8	33	9.9	92
China			17.7	51	22.1	25	22.0	67	15.4	143
New Zealand					10.6	12	7.2	22	3.7	34
Singapore							8.5	26	2.8	26
Total	100	223	100	288	100	113	100	305	100	929

NOTES: Missing=14 Awarded Applicants. Japan, Korea, and Taiwan were the only participating host sites between 2000 and 2003. Australia and China established programs in 2004, followed by New Zealand in 2007 and Singapore in 2008.
SOURCES: NSF Extant Program Data and EAPSI Applicant Survey–Item A3

4.3 Foreign Language Preparation

Fellows are not required to know the language of the host country in order to participate in EAPSI, although NSF strongly encourages them to obtain some language training prior to the fellowship period. New Zealand, Australia, and Singapore are primarily English-speaking countries and of the fellows who were placed in those sites, few reported that they engaged in studying the language of their host site to prepare for the fellowship (5 percent). Not surprising is that a much higher proportion of fellows placed in primarily non-English speaking host sites—Japan, Korea, Taiwan, and China—reported doing some type of language training in preparation for their international fellowship experience (67 percent). This included self-guided study (47 percent), a formal language training course (23 percent), and working with a conversational partner or tutor (9 percent).[46]

4.4 Logistical Aspects of Fellowship Experience

4.4.1 Pre-Departure Orientation

NSF organizes and pays for a pre-departure orientation in the Washington D.C. area, typically held in late March or early April. This orientation serves as an informational session as well as an opportunity for fellows to meet one another. Most of the fellows (87 percent) reported that they

[46] No exhibit. N=651, Missing=10 Awarded Applicants. Source: *EAPSI Applicant Survey–Item E1.*

participated in this event.[47] Of the respondents who attended, more than half indicated that they received adequate information on living expenses (63 percent) and on the culture and rules of their host site (60 percent).[48] However, less than half of respondents were provided with adequate information on lodging (49 percent), healthcare expenses (45 percent), what not to do in the host site (44 percent), what to do in case of an emergency (41 percent), or the political situation of the host site (33 percent). To supplement the information provided at the orientation, fellows were encouraged to refer to other sources such as the EAPSI handbook,[49] EAPSI host site representatives, and the Internet to prepare for their visit.

4.4.2 Administration of EAPSI in the Host Sites

NSF administers the EAPSI program in the U.S. with co-sponsorship by at least one organization in each respective host site. Typically, each host site has a central program manager who is generally responsible for the overall day-to-day logistics and coordination of the program; only one location reported that host institutions are responsible for the administrative activities related to the program.

Interviews with the program managers indicated that fellows typically participate in an additional orientation session offered by the foreign co-sponsoring organizations. Four out of the seven program managers interviewed specifically mentioned that they (or their staff) were responsible for running orientation sessions for the fellows upon their arrival in the host site. These sessions last between three days and one week and often include a "meet-and-greet" between the fellows and other researchers, embassy staff, and others. Orientation sessions also provide information and instruction to help fellows negotiate their time in the host country. According to the program managers interviewed, the orientation gives the fellows information about the research culture and environment and in some cases even includes language training.

Fellows' living expenses at the host country are supported by the foreign co-sponsoring organization in the EAPSI region. Most program managers said that they administer the students' stipends and provide insurance. In one site, the program manager reported offering fellows some guidance on how to spend their stipend money (e.g., percentage that should be spent on rent versus language classes versus other miscellaneous expenses). Program managers from some sites reported a hands-on approach with the fellows, indicating that they help to arrange their flights, pick them up at the airport, and remain in contact with them during their stay. In some locations, program managers also facilitate communication between host researchers and the fellows. Program managers from

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47 No exhibit. N=887, Missing=51 Fellows. *Source: EAPSI Applicant Survey–Item B6*

48 No exhibit. N=797, Missing=0 Fellows. This item was excluded for fellows whose response to B6=No (did not participate in the EAPSI pre-departure orientation. Responses do not sum to 100 because multiple responses were permitted. *Source: EAPSI Applicant Survey–Item B6a*

49 There are site-specific handbooks that may serve as a resource for EAPSI fellows. The handbooks contain information on program guidelines and other topics such as: host institutions and researchers, travel and housing arrangements, safety and health, schedule of activities, and communication/reporting requirements.

other sites, however, appeared to provide support only if fellows run into problems during their stay.

Program managers also described different types of support that the program provides the host researchers, which varied depending on the host site. In some cases, host researchers receive agency funds in exchange for hosting the fellows for the summer (one program manager noted that their site does not provide any financial support). Program managers from four sites said that host researchers are given an introduction to the program and advice about how to prepare for and host the fellows. In one location, for example, the program manager tells hosts in advance how to deal with potential problems (e.g., if the fellow needs to leave the country early), and recommends that the hosts encourage the students they regularly work with to engage in both research and cultural activities with the fellows.

Program managers and agency officials reflected on their experiences with the EAPSI program, and highlighted some challenges that they faced with its administration. Some challenges revolved around funding and other limited resources. One agency official noted that securing the budget is a challenge. Another location would like to increase the size of the program, or at least obtain more funding for the current program, but lobbying efforts with the government have not been successful. Limitations of other resources also posed challenges. One program manager noted that, since they host students from other countries, there is competition for host institutions and living space. At least two other program managers agreed that there can be challenges associated with finding a residence.

Program managers and agency officials cited few challenges from the perspective of the host researchers. One example of a challenge faced by host researchers was what to do if a student needed to leave early or postpone their stay. In one location, hosts did not know how to address this problem, so now the program manager's office informs the host institution about how to deal with this issue if it arises. Additionally, one agency official felt that it can be challenging for hosts to ensure that the fellows have a rewarding and fun research experience in such a short amount of time.

One of the ways that program managers learn about program challenges and solicit recommendations for improvement is by administering an end-of-year questionnaire to fellows. The results of these questionnaires are often used to make program modifications at the local level. One of the program managers also reported that they learned how to help the host enhance the experience for the fellows, and that they can make improvements to the program based on host feedback. Another noted that one of his main responsibilities is to provide feedback from these surveys to host institutions, so they can make necessary changes. Finally, one program manager reported conducting a session to debrief on the last year's experiences, where fellows spoke about their research, and their experience with the program in general. However, the manager noted that they were unlikely to receive funding for these debriefs in future years.

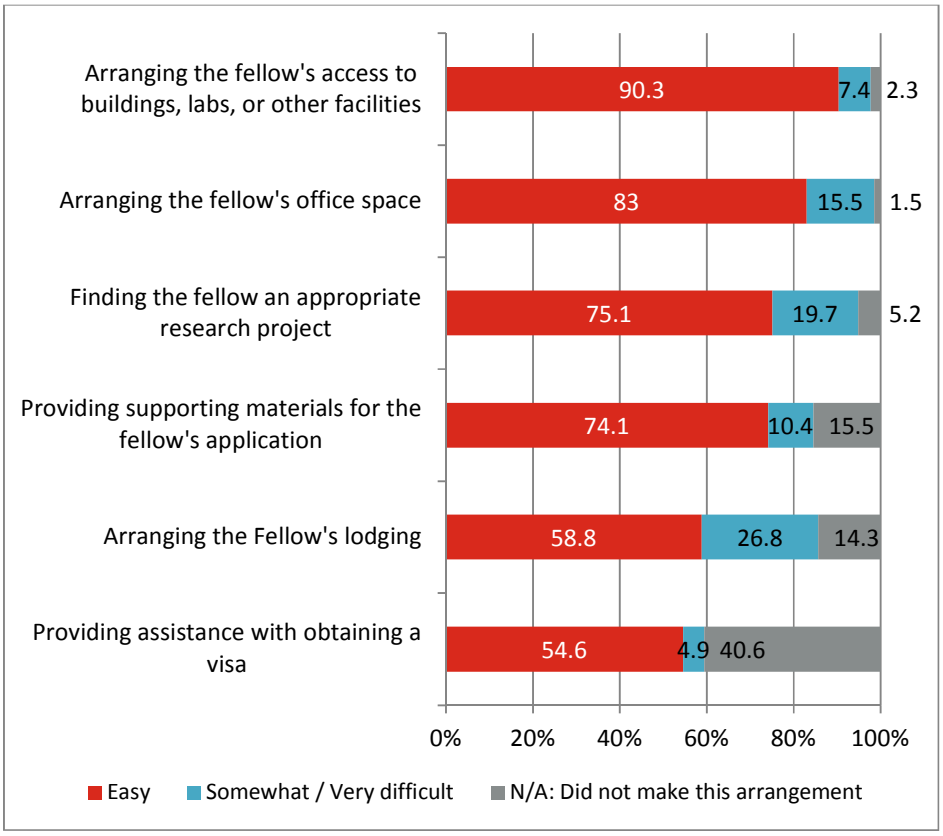
4.4.3 Fellows' Transition to the Host Site

The costs of traveling to and from the host site are covered by the EAPSI award, but the fellows are responsible for making the travel arrangements themselves. Additionally, fellows may need to obtain a visa to cover the duration of their fellowship stay and may be responsible for securing their own housing accommodations. To facilitate a smooth transition, NSF recommends that fellows contact individuals in their host site such as the foreign program manager, their host, or their host institutional representatives for assistance and information on travel and housing. Based on responses from the host researchers, it appears that more than half were involved in helping their fellow obtain visas and make lodging arrangements (Exhibit 4.2).

The hosts were asked to indicate the ease or difficulty of assisting their fellow with arranging lodging. More than half (59 percent) reported that it was easy and 27 percent experienced some level of difficulty. Similarly, over half of the hosts who helped the fellows to obtain a visa (55 percent) found this easy and 5 percent experienced some level of difficulty.

Furthermore, host researchers tended to take an active role in supporting fellows as they transitioned into the research activities at their designated site (Exhibit 4.2). A majority indicated that they assisted with ensuring that their fellow had access to buildings, labs, or other needed facilities (90 percent), arranging their fellow's office space (83 percent), and finding their fellow an appropriate research project (75 percent). More than three-quarters of the host respondents found that making these preliminary arrangements for the fellow was easy whereas 20 percent or less reported having some degree of difficulty with them.

Exhibit 4.2: Role of Hosts in Logistical Arrangements



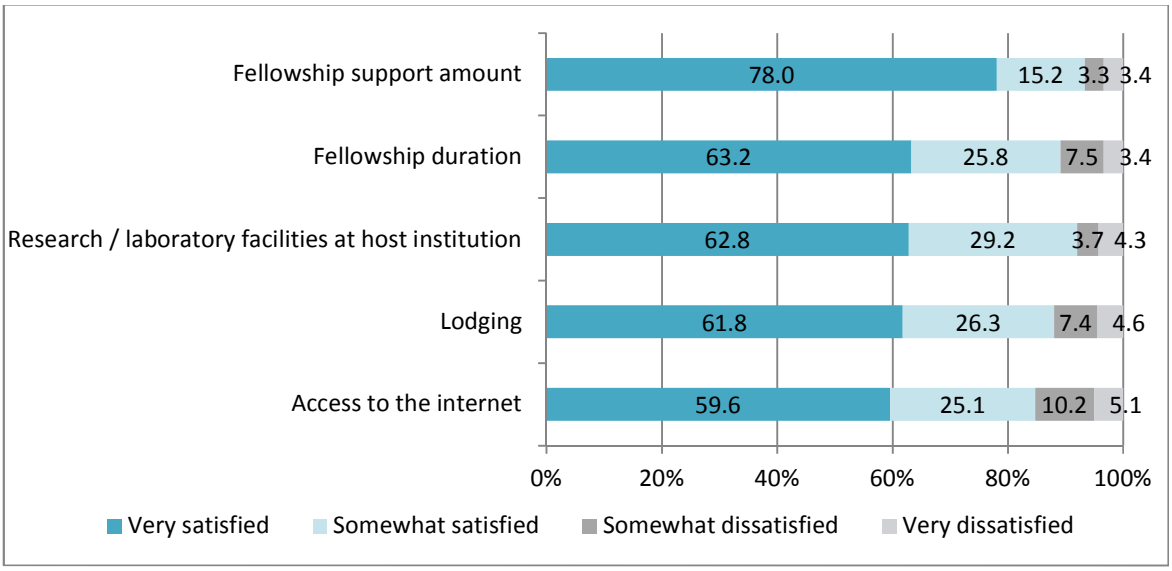
NOTES: N=656-660, Missing=5-9 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey).
SOURCE: EAPSI Host Survey–Item B7

4.4.4 Logistical Aspects of Fellowship

Nearly all of the fellows (99 percent) agreed that they received notification of their EAPSI award with enough time to make the necessary travel arrangements to the host site.[50] Sixty percent or more of respondents were very satisfied with several logistical aspects of their EAPSI fellowship, including the amount of fellowship support (78 percent), duration of the fellowship (63 percent), research/laboratory facilities (63 percent), lodging (62 percent), and internet access (60 percent); 5 percent or less expressed that they were very dissatisfied with any of these particular aspects of the fellowship (Exhibit 4.3).

[50] No exhibit. N=873, Missing=65 Awarded Applicants. Missing includes 'do not recall responses.' *Source: EAPSI Applicant Survey–Item B3.*

Exhibit 4.3: Fellows' Satisfaction with Logistical Aspects of Fellowship



NOTES: N=644-645, Missing=16-17 Fellows. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010).
SOURCE: EAPSI Applicant Survey–Item E8

Furthermore, only 11 percent of fellows reported that they encountered logistical difficulties during their fellowship stay and even fewer experienced specific difficulties with inadequate access to space, facilities, equipment, computers, resources and/or supplies (8 percent) or had legal or medical difficulties in the host site (1 percent). These challenges varied significantly by location, with the logistical challenges cited by a high of 48 percent in one location to 6 percent in another, and inadequate access cited by a high of 40 percent in one location to a low of 4 percent in another. [51]

> *It is difficult for me to imagine a better foreign experience for a graduate student primarily because of the independence afforded by the EAPSI program. Unlike other foreign experiences for graduate students ([specific program] comes to mind) EAPSI is a blank slate for students to make the most of. This is critical I think for building independent self-reliant researchers. But also the contacts one can potentially make while on the EAPSI program can be resources that prove valuable for both sides long after the conclusion of an EAPSI experience. The support is very good also meaning that students can participate with little or no financial sacrifice.* (EAPSI fellow)

Like the fellows, their U.S. advisors were satisfied with the structure of the program; an overwhelming majority of advisors agreed that both the duration (8 to 10 weeks) and timing of the program (during the summer months) were appropriate (92 and 95 percent,

[51] No exhibit. N=648, Missing=13. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). *SOURCE: EAPSI Applicant Survey–Item E5.*

respectively).[52] As discussed above, some foreign hosts, in contrast, did not see the duration of the fellowship as adequate: 29 percent of host respondents strongly agreed and 51percent agreed that the amount of time for the fellowship was too short for the proposed project.[53]

4.5 EAPSI Research Experience

Fellows' research experiences, including their collaborations with foreign scientists at their host sites, are a central component of the EAPSI program. Fellows were asked to reflect on the research they conducted and their relationship with the host and other individuals they worked with during their fellowship. Likewise, hosts were asked about their experiences serving as an EAPSI host and working with the visiting fellow. Additionally, fellows' advisors and the host location representatives (program managers and agency officials) provided additional information and feedback on the program. Taken together, responses from the various respondent groups provide a comprehensive description of the research activities and collaborations that are associated with the EAPSI program during this study's time period (2000–2009).

> *I wholeheartedly am supportive of the EAPSI program and greatly value its commitment to encouraging intellectual collaboration and cultural exchange across nations. Given the ever increasing globalization of science, fostering graduate student research experience at the international level is crucial for furthering both intellectual development and providing them with invaluable experience in conducting research in novel cultural contexts.* (Advisor of EAPSI fellow)

4.5.1 Research Environment at the Hosting Universities

The hosts most commonly described their department or unit as one that encouraged international collaborations (82 percent) and invited foreign researchers to visit their institution for research-related purposes (68 percent) (Exhibit 4.4). Just over half of the respondents characterized their department or unit as encouraging faculty to work with graduate students (53 percent).

[52] No exhibit. N=628-629, Missing=16-17 Advisors. *Source: EAPSI Advisor Survey–Items E5a, E5b.*

[53] No exhibit. N=649, Missing=16 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). *Source: EAPSI Host Survey–Item C4.*

Exhibit 4.4: Characteristics of the Department/Laboratory of Host Researchers

	Hosts (N=671)
Encouraged international collaborations	82.1%
Hosted foreign researchers visiting their institution for research-related purposes	67.7
Encouraged faculty to work with graduate students	53.2
Promoted fellowships and other opportunities for researchers in their country to conduct research in another country	32.5
Provided financial support to faculty pursuing international collaborations	21.3
Rewarded faculty for developing international research partnerships	20.1
None of the above	3.4
Did not recall	1.3

NOTES: Missing=0 Hosts.
SOURCE: Host Survey–Item A6

4.5.2 Research Activities and Collaborations in the Host Site

The survey examined whether the hosts were appropriately chosen. A majority of hosts agreed that that their research interests were well-matched with those of their fellow (82 percent), and that they and the fellow shared similar goals and expectations for the EAPSI experience (60 percent). However, less than half (48 percent) agreed that their work style was complementary to their fellow's.[54]

NSF and the foreign co-sponsoring organizations provide advice to the fellows on how to achieve a productive research experience. For example, the EAPSI handbooks encourage fellows to develop a research plan and have discussions with their host about its feasibility prior to their visit.

The program emphasizes that fellows and hosts should be mutually committed to the research project, but there are no specific requirements as to how the research project should be supervised, or who should be involved in the research project. More than half (66 percent) indicated that their host directly supervised the work they did (Exhibit 4.5). At the same time, roughly a quarter of the fellows reported that others at the host institution provided direct supervision on their work, including graduate students (27 percent), staff scientists (22 percent), and junior faculty members or postdocs (21 percent). Less than 10 percent stated that their work was not supervised by anyone.

[54] No exhibit. N=662, Missing=3 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). *Source: EAPSI Host Survey, Item C6.*

Exhibit 4.5: Individuals who Supervised Fellows' Work as Reported by Fellows

	Fellows (N=648)
Host researcher	65.6%
Graduate student(s)	26.7
Staff scientist	22.3
Junior faculty member or postdoctoral fellow	21.3
Laboratory technician or other employee/worker	6.8
Was not supervised by anyone	8.3

NOTES: Missing=13. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Item E6

Hosts also provided information about the individuals who directly worked on research with their fellow (Exhibit 4.6). The individuals most commonly cited by hosts as working with the fellows were hosts (80 percent), graduate students in the host's research group (66 percent), and other scientists in their research group (45 percent). Few hosts reported that fellows worked independently on their research without supervision (2 percent).

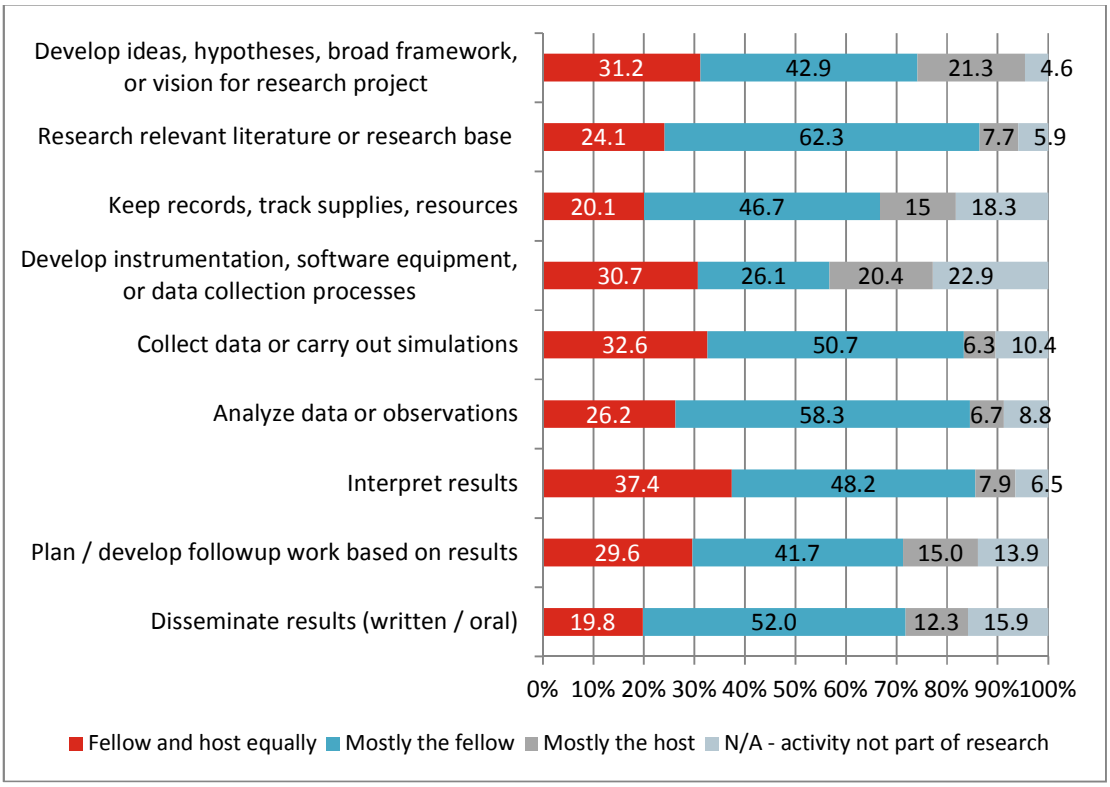
Exhibit 4.6: Individuals Who Directly Worked on Research with Fellows as Reported by Hosts

Fellows worked directly with…	Hosts (N=664)
I [Host] worked directly with the fellow	80.0%
Graduate students in my research group	65.5
Research scientists in my research group	44.7
Postdoctoral fellows in my research group	29.1
Undergraduate students in my research group	16.3
Other visiting EAPSI fellows	3.8
Other individuals not listed above	8.3
No supervision but independently	1.7
None of the above	0.3

NOTES: Missing=1. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Host Survey–Item C1

Both fellows (Exhibit 4.7) and hosts (Exhibit 4.9) provided information about the activities on which they worked mostly independently and on which they collaborated. In general, a larger proportion of fellows reported that they worked on various research activities independently (between 26 and 62 percent) as opposed to equally with the host or someone in the host's group (between 20 and 37 percent). The activities fellows most commonly cited as being done equally with the hosts were interpreting results (37 percent), collecting data or carrying out simulations (33 percent), developing instrumentation (31 percent), and developing ideas or hypotheses (31 percent).

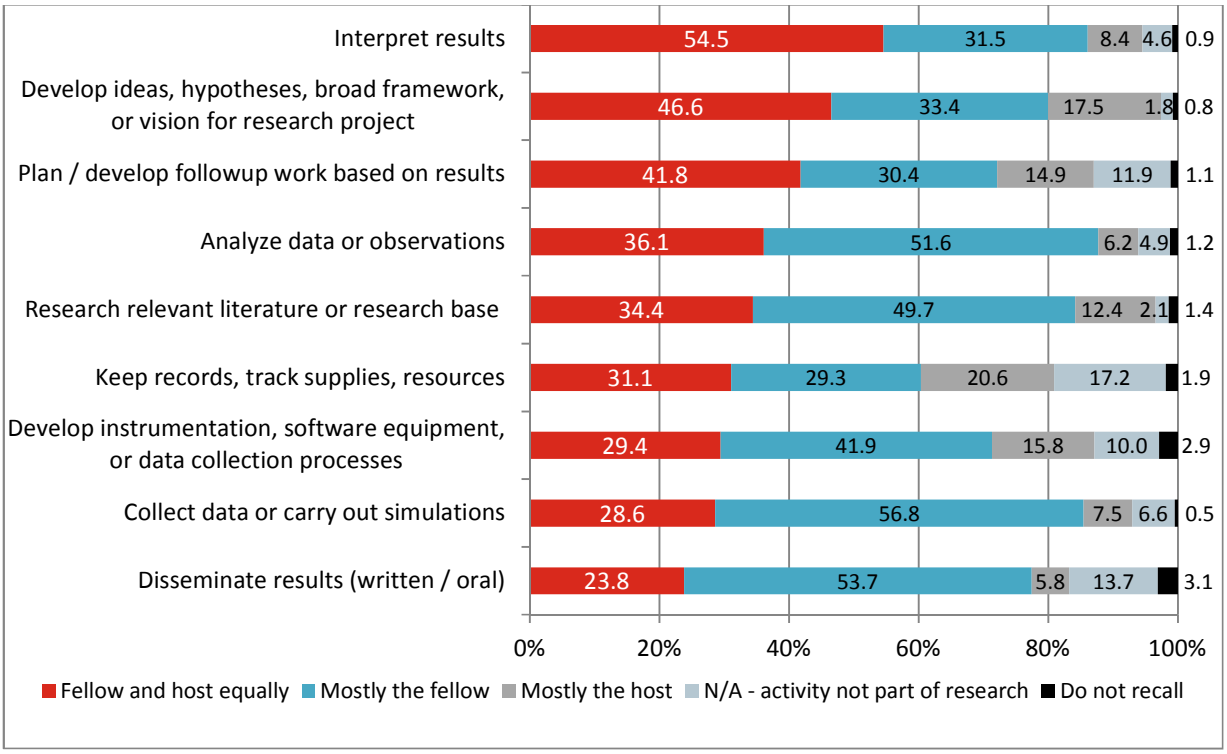
Exhibit 4.7: Individuals Engaged in EAPSI Research Activities as Reported by Fellows



NOTES: N=624-633, Missing=28-37. This item was only answered by fellows whose response to D1c=1,2, or 4 (indicated that they were not still in graduate school as of October 1, 2010).
SOURCE: EAPSI Applicant Survey–Item E4

Generally speaking, hosts' responses followed the pattern of responses from fellows (Exhibit 4.8). For example, on all but four research activities, a higher proportion of hosts reported that their fellow primarily worked independently (between 30 and 57 percent) as opposed to equally with them [hosts] (between 24 and 36 percent). The activities hosts most commonly cited as being done equally with the fellows were interpreting results (55 percent), developing ideas or hypotheses (47 percent), planning or developing follow-up work based on results (42 percent), and analyzing data (36 percent).

Exhibit 4.8: Individuals Engaged in EAPSI Research Activities as Reported by Hosts



NOTES: N=646-653, Missing=12-19. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). This question matched one of the questions on the fellow survey except that the response category "do not recall" did not appear on the fellow survey.
SOURCE: EAPSI Host Survey–Item C3

Discrepancies between fellows' and hosts' perceptions may be explained by the tendency of individuals to overstate their own contribution to a joint task relative to other members of the group,[55] and biases in the way individuals themselves acting in accordance with an internal schematic encompassing their motives and goals.[56] Thus, it is possible that fellows perceived their role as active researchers, whereas hosts perceived their contributions as mentors, nurturing the fellow's research training through collaboration.

4.5.3 Involvement of Fellows' Home Institution

During the EAPSI fellowships, many fellows maintained contact with their home institutions. About one-third of fellows reported that other researchers from their home institution became involved in

[55] Kruger, J., and Savitsky, K. 2009. On the genesis of inflated (and deflated) judgments of responsibility: Egocentrism revisited. *Organizational Behavior and Human Decision Processes*, 108 (1), 143-152; Ross, M. & Sicoly. F. (1979). Egocentric biases in availability and attribution. *Journal of Personality and Social Psychology,* 37, 322-336.

[56] Woike, B. 2008. A functional framework for the influence of implicit and explicit motives on autobiographical memory. *Personality and Social Psychology Review, 12(2)*, 99-117; Conway, M.A. and Pleydell-Pearce, C.W. 2000. The construction of autobiographical memory in the self-memory system. *Psychological Review*, 107(2), 261-288.

the research project. These individuals included the fellow's graduate advisor (32 percent), other graduate students (7 percent), other faculty (4 percent), and undergraduate students at their graduate institution.[57] Similarly, the graduate advisors indicated that during the time their student/fellow was visiting the host institution, they provided ongoing academic support (70 percent) and helped facilitate collaboration between the fellow/student and the host researcher (52 percent – Exhibit 4.9). Advisors were less likely to provide the fellow/student with logistical, cultural or language support (16 percent) and to have visited him/her at the host institution (11 percent).

Exhibit 4.9: Ongoing Support Provided by Graduate Advisor

	Advisors (N=644)
Provided academic support to the fellow	70.2%
Helped facilitate collaboration between the fellow and the host scientist	51.9
Worked with the fellow to develop a publication based on research conducted at host institution	37.9
Provided logistical, cultural, or language support	16.5
Visited the fellow at the host institution	11.3
Other	5.9
None of the above	18.2

NOTES: Missing=0 Advisors. Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Advisor Survey–Item C1

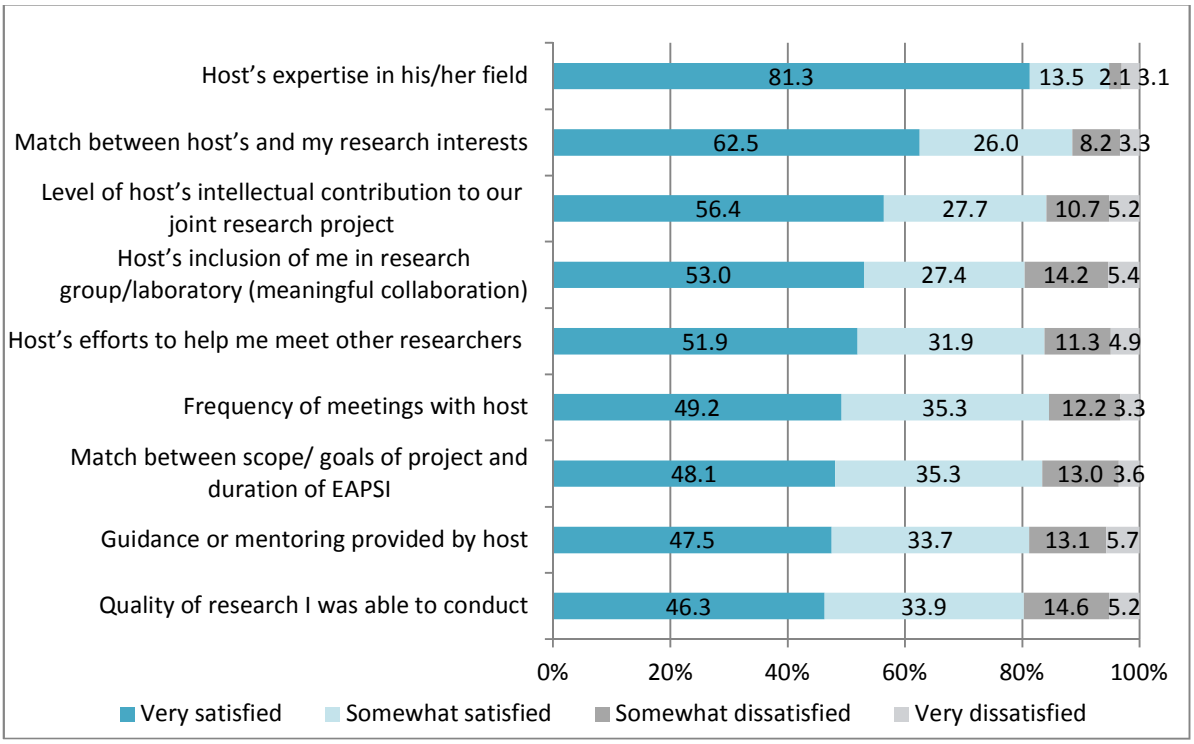
4.5.4 Fellows' Satisfaction with Research-Related Activities at Host Site

Most fellows were satisfied with several aspects of the EAPSI fellowship that pertained to their research and to interactions with their host (Exhibit 4.10), in particular the host's expertise in his/her field (81 percent very satisfied, 14 percent somewhat satisfied), the match between the fellow's research interests and the host (63 percent very satisfied, 26 percent somewhat satisfied), and the level of the host's intellectual contribution to their joint research project (56 percent very satisfied, 28 percent somewhat satisfied). Less than 20 percent of fellows were dissatisfied with any specific area of the fellowship.

> *I was very satisfied with the host institution and the researchers who worked there. People were very friendly and went out of their way to include me in excursions and meals, as well as in scientific discussions. The senior professor in the research group was very gracious and met with me several times to discuss research and science. He also asked me to review a manuscript for the journal for which he served as editor.* (EAPSI fellow)

[57] No exhibit. N=648, Missing=13 Fellows. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). Responses do not sum to 100 because multiple responses were permitted. *Source: EAPSI Applicant Survey–Item E7*

Exhibit 4.10: Fellows' Satisfaction with EAPSI Research-Related Activities at Host Site



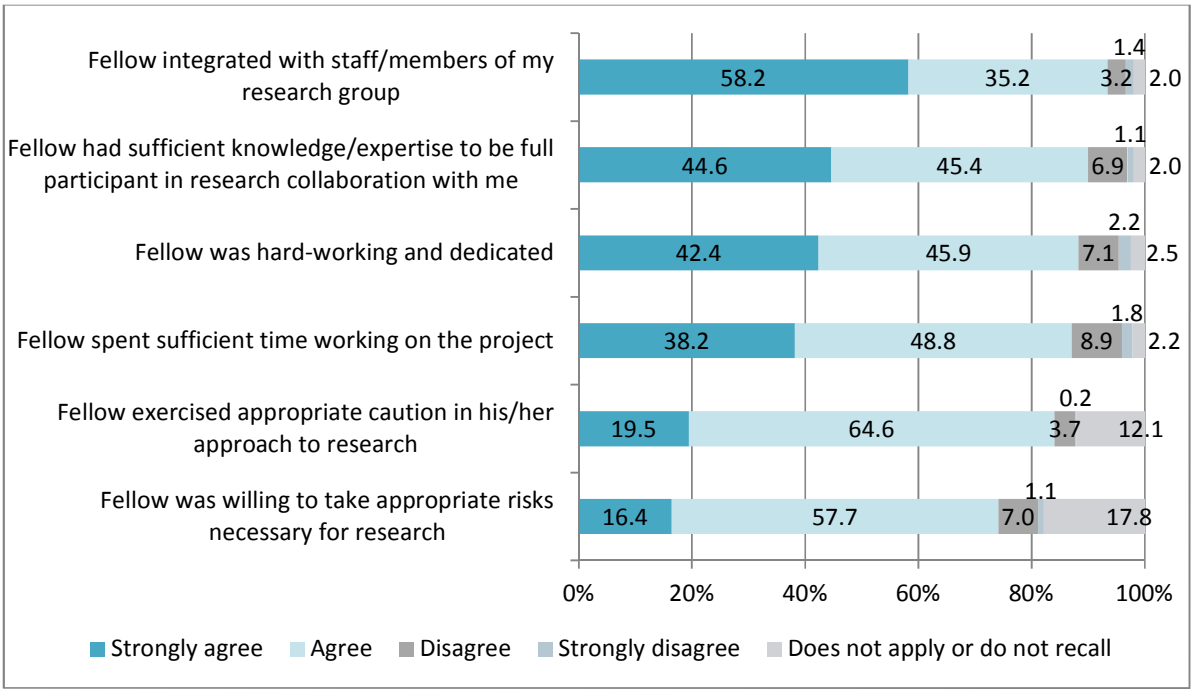
NOTES: N=628-640, Missing=21-33. This item was only answered by fellows whose response to D1c=1,2, or 4 (indicated that they were not still in graduate school as of October 1, 2010).
SOURCE: EAPSI Applicant Survey–Item E8

4.5.5 Host Feedback on Interactions with Fellow

Similarly, a majority of hosts provided positive feedback on the EAPSI fellow they hosted. At least 90 percent of hosts strongly agreed or agreed that their EAPSI fellow demonstrated sufficient knowledge and expertise (45 percent strongly agreed, another 45 percent agreed) and integrated well with their research group (58 percent strongly agreed, 35 percent agreed). A similarly high proportion of hosts agreed that that their fellow was hard-working and dedicated (42 percent strongly agreed and 46 percent agreed) and that their fellow spent sufficient time working on the project (38 percent strongly agreed and 49 percent agreed, Exhibit 4.11).

> *The fellow introduced a new experimental system and a new idea into my group. The experience working on a new experimental system was quite stimulating for me. She worked efficiently, quickly setting up experimental conditions to obtain reliable results, and made successful accomplishments in the short period of her stay.* (EAPSI host)

Exhibit 4.11: Host Feedback on Interactions with Fellow



NOTES: N=645-651, Missing=14-20 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey).
SOURCE: EAPSI Host Survey–Item C4

Hosts rated EAPSI fellows favorably compared to other graduates students they worked with; 19 percent of hosts reported that they were "much more satisfied," 26 percent were "somewhat more satisfied," and 37 percent were "equally satisfied" with their EAPSI fellow compared to other graduate students.[58]

In addition, many hosts described specific characteristics or skills of the fellow that they found particularly appealing. For example, hosts often referenced the fellow's motivation and initiative.

> *She worked very hard indeed presenting great motivation to work in her research field. Though my team members spent lots of time and energy helping her to conduct field works, I know they learned much from her.* (EAPSI host)

> *[The fellow] was very motivated. He could work independently without the need of constant supervision. He worked hard. He was well trained and had sufficient knowledge in what he was going to do. He had sufficient cultural sensitivity and savvy to function in a different culture. He was a well-rounded person. It was a pleasant experience professionally and personally to host him.* (EAPSI host)

[58] No exhibit. N=652, Missing=13 (Hosts). This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). *Source: EAPSI Applicant Survey–Item E1*

Other hosts commented on the fellow's interpersonal skills and thought they integrated into the lab well.

> *[The fellow] brought a level of maturity to the research culture amongst the other graduate students in my lab at the time. He was supportive and collaborated on a number of other projects and fully integrated in to the laboratory. (EAPSI host)*

Hosts also were impressed with the academic and professional qualifications of the student.

> *He brought in the skills that we did not have in our research group and applied it for the experiments in our facility. He was very hard working, and also helped out installation of some of our research equipment which falls into his expertise. (EAPSI host)*

4.5.6 Difficulties with EAPSI Research Activities and Collaboration

Consistent with the high levels of satisfaction expressed by fellows, only a minority of fellows expressed difficulties related to their research activities and host interactions (Exhibit 4.12). Seventeen percent reported that they did not receive enough guidance from their host (or their host's research group) and less than 6 percent cited other difficulties related to their research activities, specifically being assigned a role less than merited by their skills or knowledge (5 percent), not receiving credit for their contributions to advancing a research project (1 percent), lack of respect given to their ideas (1 percent), and being assigned work that was someone else's responsibility (1 percent). Likewise, few hosts reported specific challenges collaborating on research with their EAPSI fellow (Exhibit 4.12).

Exhibit 4.12: Difficulties with EAPSI Research Activities and Collaboration

Fellows' Difficulties [a]	Fellows
Not enough guidance from host/host's research group	16.6%
My role on the project was less than that merited by my skills/knowledge	5.4
Not given credit for my contributions to advancing a project	1.2
I felt that my ideas were not treated with respect	1.2
I was asked to do work that was someone else's responsibility	1.1
Hosts' Difficulties [b]	**Hosts**
Fellow did not devote enough time/effort to collaboration	7.9%
Fellow had unanticipated gaps in his/her preparation to conduct research with me	3.6
Fellow worked too independently, did not work well as a collaborator or team member	2.9
Fellow needed too much guidance	2.0
Fellow lacked sufficient understanding of cultural norms in my country	2.0
The fellow and I had a difference of opinion about the direction of the research	1.2
Fellow was disrespectful, caused conflict with my research group	0.8

NOTES:
[a] N=648, Missing=13 Fellows. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). Responses do not sum to 100 because multiple responses were permitted.
[b] N=658, Missing=7 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Item E5, EAPSI Host Survey–Item E3

In their interviews, host site representatives cited few challenges that arose from the research itself. Although one program manager stated that the main challenge faced by fellows is how to deal with the fact that, on occasion, their research does not go as planned. Another respondent noted that there are some instances where the host institutions are uncomfortable assigning a student to the requested researcher. This respondent suggested that it might be better to work with host institutions before putting out a list of researchers to participants, in order to minimize potential disappointments.

4.6 Professional and Cultural/Leisure Activities

4.6.1 Fellows' Engagement in Professional Activities

In addition to engaging in research, fellows are encouraged to participate in a variety of other professional activities during their time at the host site. The most common activities reported by fellows (Exhibit 4.13) included visiting other educational or research institutions (72 percent), networking with colleagues from institutions outside their host institution (64 percent), and giving a presentation or talk to researchers (63 percent).

Exhibit 4.13: Engagement in Professional Activities in the Host Site

	Fellows (N=651)
Visit(s) to educational or research institutions other than my host institution	71.5%
Networking with colleagues from institutions other than my host institution	63.5
Gave a talk or presentation to researchers at my host site	62.9
Lectures, colloquia, seminars in my field	54.3
Visit(s) to businesses/industrial laboratories	39.5
Language courses or language study	36.1
Other professional activities not listed above	5.5
Did not attend or participate in any professional activities	3.7

NOTES: Missing=10 Fellows. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Item E3

Most fellows were either very satisfied (52 percent) or somewhat satisfied (36 percent) with the professional connections they made during their fellowship; 4 percent were very dissatisfied and 8 percent were somewhat dissatisfied.[59]

[59] N=639, Missing=22 Fellows. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). Responses do not sum to 100 because multiple responses were permitted. *Source: EAPSI Applicant Survey–Items E8*

4.6.2 Fellows' Engagement in Cultural/Leisure Activities

One of the main purposes of the EAPSI program is to provide U.S. graduate students with an orientation to the society, culture, and language of their respective East Asian or Pacific host site. Nearly all fellows confirmed that they participated in cultural and leisure activities while abroad (Exhibit 4.14). Fellows took part in sightseeing (97 percent), exploring the landscape or geography (91 percent), visiting museums (89 percent), and attending festivals, holiday events or religious ceremonies (70 percent) in their host site.

> *The whole summer was really memorable; it is difficult to pinpoint precisely one activity/event that distinguishes itself from all the rest. However, I will say that staying with a host family for the weekend was a remarkable experience and is a component of the program I hope they maintain.* (EAPSI fellow)

Exhibit 4.14: Engagement in Cultural/Leisure Activities in the Host Site

	Fellows (N=651)
Sightseeing	96.5%
Outdoor activities to explore the landscape/geography	91.3
Museums	88.6
Festivals, holidays, or religious ceremonies	69.8
Sporting events	46.5
Non-scientific lectures or presentations	35.0
Other cultural or leisure activities not listed above	6.5
Did not participate in any cultural activities	0.1

NOTES: Missing=10 Fellows. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Item E2

4.6.3 Difficulties Related to the Culture and Language of Host Site

Among all of the difficulties that fellows were asked about, communication or language issues were the most frequently cited (29 percent). As expected, these difficulties varied significantly by host site where a greater percentage of fellows who were in primarily non-English-speaking host sites reporting communication or language issues (ranging from 28 to 44 percent in these sites) compared to fellows who were in primarily English-speaking host sites (ranging from 0 to 10 percent in these sites).[60]

> *Trying to be a good researcher when I was hindered by language difficulties. Though I did feel like i got a better grasp on the everyday language usage by having to use it—it didn't necessarily translate to professional level understanding of the language.* (EAPSI fellow)

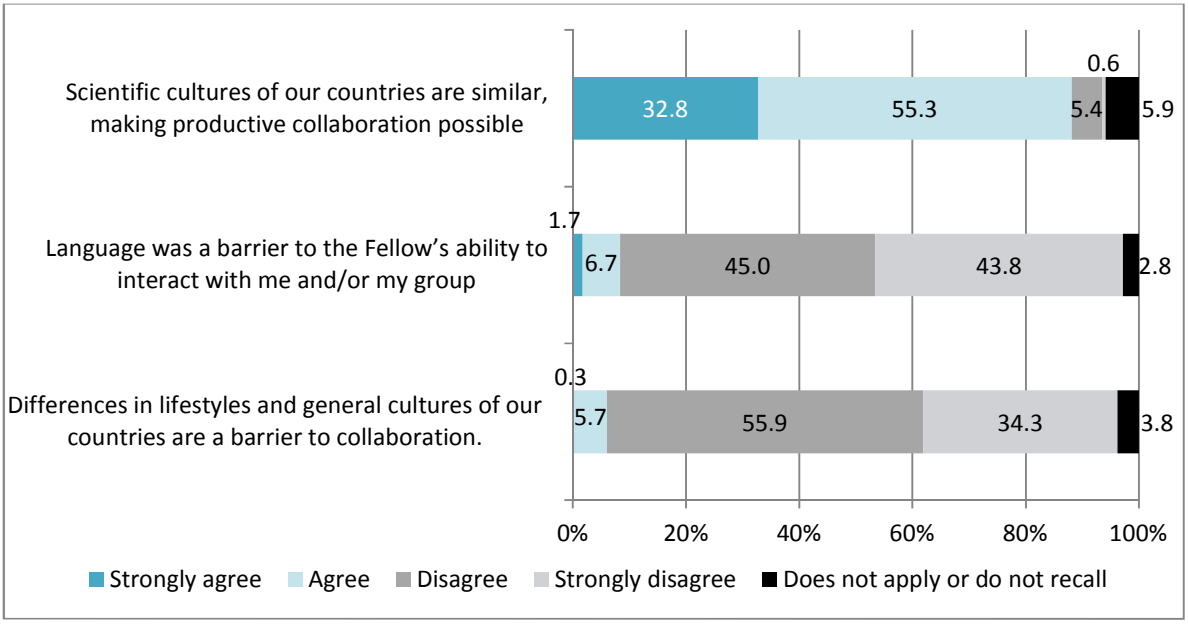
[60] No exhibit. N=648, Missing=13. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). *SOURCE: EAPSI Applicant Survey–Item E5.*

Less than 3 percent of fellows cited any difficulties based on gender (2 percent), racial or ethnic (1 percent), or cultural, or religious backgrounds (1 percent).[61] Likewise, few hosts encountered cultural barriers to hosting their fellow. Merely 2 percent of host respondents cited that they had challenges with hosting their fellow because he/she lacked sufficient understanding of the cultural norms in their country.[62] Rather, 33 percent of hosts strongly agreed and 55 percent agreed that the scientific cultures of the U.S. and their respective location are similar, making productive collaboration possible.

> *The most challenging aspect of my EAPSI experience was living in a cultural that was so unique from my own. There were cultural expectations and norms that had to be respected. This was not a problem, but was, at times, challenging.* (EAPSI fellow)

Only 8 percent of hosts reported experiencing challenges with their fellow's lack of familiarity with the language. When asked specifically if language was a barrier to the fellow's ability to interact with them [host] or others in their research group, 44 percent strongly disagreed and 45 percent disagreed that this was an issue (Exhibit 4.15).

Exhibit 4.15: Language/Cultural Barriers Experienced by Hosts



NOTES: N=647-653, Missing=12-18 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey).
SOURCE: EAPSI Host Survey–Item C4

[61] No exhibit. N=648, Missing=13 Awarded Applicants. This item was only answered by fellows whose response to D1c=1, 2, or 4 (indicated that they were not still in graduate school as of October 1, 2010). *SOURCE: EAPSI Applicant Survey–Item E5*

[62] No exhibit. N=658, Missing=7 Hosts. This item was only answered by hosts whose response to A2=1 (indicated that they did host the EAPSI graduate student named in the survey). *SOURCE: EAPSI Host Survey–Item E3.*

In their interviews, foreign counterpart representatives identified some cultural challenges faced by fellows and hosts. Two respondents identified a chief challenge faced by the fellows as how to deal with cultural differences. One program manager noted that while there are many similarities between [location] and the U.S., there are cultural differences which the students do not always take into account. This respondent finds it difficult that "the students in the U.S. don't really acknowledge that there are cultural differences between the U.S. and [location]. Economically, they are both developed countries. The cultural attitudes in the U.S. are the same in [location]; however, there are sometimes miscommunications." Another program manager noted that fellows can experience challenges due to "cultural differences in their daily lives," including differences in the research environment and living style between the U.S. and their host country.

4.7 Recommendations

4.7.1 Host Location Representatives

Agency officials think that the NSF is meeting its goal of increasing collaboration with the countries participating in EAPSI. Respondents were generally satisfied with the level of communication and involvement of the NSF as well. Communication between NSF and the location officials usually occurs via email, although there were a couple of locations that reported s face-to-face contact with NSF staff, particularly when their orientations were held in the U.S. Some managers specifically reported that they appreciate NSF's flexibility in allowing each country to manage their own program.

Respondents had a few suggestions for improvements regarding the role of NSF. The most popular suggestion, expressed by respondents from five locations, was for the NSF to establish a reciprocal program through NSF whereby their students could have opportunities to conduct research in the U.S. alongside American hosts. One respondent noted that she would like to increase the size and scope of the program in her country, but this was not possible due to funding constraints.

A few other specific improvements or modifications were each mentioned by one or two individuals. One respondent mentioned that in the past NSF had sent a representative to visit the location, and continuing that practice would be welcome; the respondent recognized that the time required to travel such a large distance did introduce difficulties to this practice. Two locations would like to see more effort to increase awareness and recruit U.S. students to the program.

Other recommendations were made regarding the fellow selection process. One respondent requested that NSF share information about the criteria used to select the EAPSI fellows; this respondent expressed interest in learning more about the selection process. Yet another respondent suggested a collaborative selection process that involved the foreign location office. Additionally, two respondents suggested changes to the timing of the selection process. Both indicated that it would be helpful for NSF to share materials with the sites earlier in the process; specifically, one representative expressed a desire to receive applicants' documentation in early February, as opposed to mid- to late February, in order to have enough time to complete the final participant list and contact hosts, while another representative noted that receiving the pre-orientation materials earlier in the year would be helpful.

Only one suggestion was made regarding the structure of the fellowship. Specifically, the representative from one location suggested that NSF and the location agency should host a collaborative activity at the end of the program, during the 8th week, where the fellows could discuss their research and experiences with each other.

Representatives from two locations expressed a desire for the NSF to provide additional post-fellowship support. One respondent suggested that it would be beneficial to get support from NSF on how to follow up with alumni in order to gather data on whether collaboration between scientists from the U.S. and the location increases in the long run. Another comment expressed interest in having NSF involved in campaigns for the alumni to return to the location, in order to further collaboration. Finally, one of the managers suggested that it might be useful to open the summer institute to undergraduate students, although this was not an official view of the agency.

4.7.2 Survey Respondents

Fellows, hosts, and advisors were asked to provide recommendations for the program. The most common suggestion made by fellows regarded the duration of the program.

> *I went for only 2 months. It would have been nice and more productive if I had gone for at least twice that long. My research really only got going after about 3 weeks on the ground.... It can take that long to understand the "lay of the land."*

> *I would make it available for a longer period of time, especially for life sciences. Part of the issue with my project was that 8 weeks was not sufficient time to truly prepare and conduct a research project.*

Some suggestions related to logistics. For example, some fellows requested more assistance with finding housing, getting access to resources, distributing finances, taking language courses, etc.

> *I would give the grant money to the students when they arrived in Japan. I would not depend on the host scientist to give the money to the students. It was uncomfortable asking for the money, especially in a culture like Japan.*

> *I think the logistics of sending students to [country] must be very difficult, but I felt very unsupported. For example, no one really knew how we were getting our visas. First it was as a group, then individually, etc. When I arrived at my host site, I was told I would need safety training before entering the lab, something that took almost two weeks to schedule and complete.*

> *I would better formalize the finding of housing. I was fortunate in that my host obtained visiting scientist housing at a very reasonable cost. Others in the program were spending excessive amounts on hotels because their hosts could not or did not find good housing.*

Some also suggested changes to the orientation programs or pre-departure activities.

> *I'm not sure the orientation program in Washington DC is really necessary. It was fun but I didn't learn very much and it takes time while people are usually scrambling to get everything together for the summer away. You could consider transferring those resources to more orientation in the*

host country. Another idea is to provide a small reimbursement for language study in the U.S. before the program starts.

Encourage more communication between the host and the graduate student prior to starting the EAPSI program. Have students create a more explicit plan with their host so that there is a more clear deliverable at the end of the program.

5 Post-Fellowship Outcomes

The primary goals of the EAPSI program are to (1) introduce students to East Asia and Pacific science and engineering in the context of a research setting, and (2) help students initiate scientific relationships that enable future collaborations with foreign scientists.

This chapter examines the impacts of the program, by comparing EAPSI fellows' engagement in productive research collaborations with foreign collaborators and post-fellowship career characteristics to those of a matched comparison group of unfunded fellows. These career outcomes of EAPSI fellows are placed in a larger national context by comparing the EAPSI PhD fellows to data from the Survey of Doctoral Recipients and EAPSI master's fellows to respondents to the National Survey of Recent College Graduates with master's degrees.

This chapter also explores the outcomes of the program from the perspectives of the foreign counterparts involved in administering the program, the EAPSI fellows, and the fellows' foreign hosts and U.S. advisors. In addition to outcomes for program participants, this chapter elaborates on the outcomes of the program beyond the direct participants.

Specifically, this chapter answers the following questions:

- Does the extent to which former fellows engage in international collaborations differ from that of unfunded applicants?
- Do fellows' post-award career activities and job characteristics differ from those of unfunded applicants and other STEM graduates in the U.S.?
- What do program participants view as the outcomes of the program?
- Do the outcomes of program participation extend beyond the direct participants?

5.1 Key Findings

- Foreign locations become involved in EAPSI to increase research collaborations with the U.S., to establish a research network and ongoing relationships among scientists, and to provide younger researchers from the U.S. with an opportunity to understand the R&D activities in their countries.
- All EAPSI fellows would recommend the fellowship to another graduate student seeking an international experience, 92 percent of advisors would or have recommended the program to other graduate students, and 79 percent of hosts would or have recommended hosting an EAPSI fellow to others.
- Unfunded applicants continue to pursue other avenues for their international experiences. EAPSI fellows and unfunded applicants with PhDs held a similar number of international postdoctoral fellowships (0.32 versus 0.28 fellowships, respectively), yet fellows were less likely than unfunded applicants to have been employed outside the U.S. (13 versus 39 percent, respectively).

- Forty percent of fellows and 35 percent of unfunded applicants report working with individuals located in other countries. Among those who work with a collaborator in a foreign country, unfunded applicants were more likely to claim that their collaboration included joint publications or jointly developed products (82 versus 92 percent).
- Compared to unfunded applicants, fellows reported a higher number of publications co-authored with a foreign collaborator (2.2 versus 1.6 publications) and a larger proportion of publications that include a foreign co-author (22 versus 17 percent), suggesting that fellows have more productive collaborations with foreign counterparts than do unfunded applicants.
- Fellows were also more likely than unfunded applicants to engage in activities to foster international collaborations (40 versus 30 percent, respectively).
- Overall, fellows and unfunded applicants were similar along a few of the education and career outcomes examined in this study; both groups were equally likely to have obtained a master's degree (37 versus 38 percent) or PhD as their highest degree (53 versus 48 percent) and had a similar number of total publications over a period of time following program participation (9.8 versus 9.5 publications).
- Benchmarking analyses comparing career outcomes of EAPSI fellows to national estimates for science and engineering PhD graduates found that EAPSI PhD fellows were more likely to be working with individuals in other countries (80 percent of fellows holding a PhD versus 31 percent of the SDR sample).
- A majority of fellows perceived their participation in EAPSI as having expanded their education and career opportunities. Among fellows no longer in graduate school, 78 percent felt it qualified them for a broader range of opportunities while a minority of fellows felt that their EAPSI participation had resulted in a lost opportunity; less than 1 percent felt it had constrained their opportunities, and 11 percent felt it had delayed their degree completion.
- Just over half of fellows who were no longer in graduate school indicated that their participation led to valuable connections to researchers outside the U.S. (52 percent) and made them more competitive for jobs (51 percent).
- Advisors also found the program successful in helping fellows further their research and collaborations abroad by helping them gain exposure to research in another country (86 percent), advancing their research agenda (78 percent), and establish collaborations with researchers outside the U.S. (75 percent)
- Foreign agency representatives identified benefits of the program for fellows, other students in the host lab or institution, host researchers, and the host institutions and countries. They commonly cited increased opportunities for collaboration and networking as benefits of participation.
- A majority of the fellows indicated that their relationship with the host has continued beyond the fellowship period, either through subsequent research collaborations with the host (20 percent), and/or additional communications (60 percent). Hosts had similar responses to the

fellows, as 29 percent stated that they had further collaborated with the fellow and 48 percent had communications with the fellow post-fellowship.

- More than half of the fellows engaged in activities where they extended the benefits of their EAPSI participation with others, particularly by sharing resources they collected or tools developed during their fellowship (59 percent) and teaching others about the research methods they learned during that time (56 percent).

5.2 Overall Perceptions of EAPSI

5.2.1 Host Site Representatives' Descriptions of Progress toward Program Goals

The agency officials who were interviewed described the program goals from their perspectives and the progress the program made toward these goals. They reported that their countries originally became involved in EAPSI to increase research collaborations with the U.S., to establish a research network and ongoing relationships between scientists, and to provide younger researchers from the U.S. with an opportunity to understand the R&D activities in their countries. Their reasons for participating align with NSF goals for the EAPSI program.

Each program manager also noted that the primary goal of their EAPSI program was to increase collaboration between the U.S. and their country. As one program manager explained, "the goal is for us to provide the opportunity for faculty and younger generations to engage in scientific dialogue, face-to-face discussion, personal exchange of ideas or issues in science and technology, research, and career development. We want this to be a life-long experience." In this way, the program is mutually beneficial to both the U.S. and the foreign location, the perspectives of emerging researchers are broadened, and lasting professional relationships are established.

Almost all the program managers felt that this goal was being met successfully. One respondent felt that it was still too early to accurately tell whether EAPSI has increased collaborations between U.S. researchers and researchers in the location. This respondent also raised a question about whether the dosage of the EAPSI experience was sufficient, indicating that the research experience needs to be longer in order to truly facilitate a collaborative working relationship, stating, "for participants to have a true understanding of R&D overseas, it is necessary for them to spend an extended stint, of perhaps one year in [location]. Otherwise, it could just be a sponsored holiday to the far east." Another respondent noted that it is difficult to attribute an increase in collaboration to EAPSI in particular, since the foreign agency engages in many activities to increase international collaboration.

A strategy cited by one location for maintaining collaboration is to establish an alumni network for the fellows. This "allows them to maintain a collaborative relationship with the [location] even after they are recruited elsewhere." Another respondent indicated that while the goal of increased collaboration was being met, they would like to build a new mechanism for researchers in the location and the U.S. to communicate and exchange information after their visit.

5.2.2 Respondents' Satisfaction with the Program

Survey respondents were also supportive of the program. All of the EAPSI fellows said that they would recommend the fellowship to another graduate student seeking an international experience. Moreover, nearly all fellows would also recommend their host site (99 percent) and their host scientist (91 percent). Similarly, most advisors (92 percent) would recommend or have recommended the program to other graduate students. Satisfaction among the hosts was somewhat lower, with 79 percent of respondents saying that they would recommend (or have already recommended) hosting an EAPSI fellow to others.

Open-ended comments provided by respondents offer more insights on the benefits of the program. When asked to elaborate why they would or would not recommend the program, some fellows emphasized the importance of learning how research was performed in foreign countries.

> *I consider EAPSI fellowship a great opportunity for professional collaboration, life-long professional connections, a way to grow professionally. Connecting to another culture and understanding its roots help us to become better human beings. The program broadens one's perspectives and views of the world. It creates a different (from home country) view of potential world problems and the ways to solve them. Overall, it is a great experience for any graduate student to visit another country not as a pure tourist, but as a researcher, to dive into a project and work side by side with the foreign colleagues.* (EAPSI fellow)

Others also mentioned the contribution the program made to their growth as individuals and the benefits of being exposed to other cultures.

> *I was much more narrow minded before my experience. I guess I was afraid of the world outside my little bubble. Being forced to get out there and see if I could make it, with Uncle Sam propping me up, was the best growth experience of my life. Often I need to reach back to those lessons and remember what I learned.* (EAPSI fellow)

> *It was an incredible experience! It provided an opportunity to work and learn in a different country as well as providing orientation to country and culture. The crash course in language, the field trip and other activities like the homestay experience were awesome!* (EAPSI fellow)

Fellow advisors would recommend the program because it provides students with valuable and broader experiences and perspectives.

> *I think experience in other labs, and international experience in particular, can be very valuable to the development of graduate students as scientists.* (Advisor to EASPI fellow)

> *I have personally seen many benefits to our students. It provides a new perspective and appreciation of the research culture in different countries and opens much needed collaborations.* (Advisor to EASPI fellow)

> *I strongly believe that international experiences are a very valuable component of a student's education. International exchange opens the mind and promotes diversity and creativity.* (Advisor to EASPI fellow)

> *U.S. students often lack international experience, and as a result can become provincial or intellectually limited. EAPSI offers a very good controlled but useful research-abroad experience.* (Advisor to EASPI fellow)

Advisors also described the value of forging collaborations with foreign colleagues and institutions.

> *I think the EAPSI program is one of the best programs at NSF for fostering a global, diverse and international scientific workforce in the U.S. I cannot emphasize how much this program has been valuable for building positive international research collaborations as well as further scientific discovery, particularly in my research area [disciplines].* (Advisor to EASPI fellow)

> *I believe there is enormous value in international collaborations, and initiating these as early as possible. Students have the opportunity to favorably compare themselves with students educated in other systems/cultures. Students broaden their perspective, are introduced to ideas and approaches outside the "home." Students establish life-long collaborations/associations, often with scientists much senior to themselves, opening future postdoctoral/career opportunities.* (Advisor to EASPI fellow)

Also, advisors noted that the program improved fellow career options.

> *Working at a foreign institution, with different research supervisors, is an excellent experience, that broadens both their intellectual perspective, and also gives them different research experiences that helps further their careers.* (Advisor to EASPI fellow)

The benefits of the program from the hosts' perspective included scientific, cultural, and linguistic benefits to their students.

> *It is very important to have our students and staff be exposed to students from other prominent research groups in our area to appreciate the strengths and weaknesses in our own approaches.*

> *[The fellow's] coming to my lab has offered an opportunity for my group to speak English and provided a window to know how a U.S. graduate student's attitude toward doing science.*

5.3 Impact of the Program on Fellows

The impact of the EAPSI program was examined by comparing outcomes for EAPSI fellows to a rigorously matched group of unfunded applicants (using propensity score matching methods detailed in Appendix C) to identify the unique effects of the program.

Two sets of outcomes were tested: first, a set of outcomes relating to fellows' subsequent engagement in international research and collaboration, and a second broader set related to careers.[63] For each outcome, the impact of EAPSI was estimated for a matched group of awardees and non-awardees, controlling for number of years since EAPSI application, under-represented minority status, gender, and where applicable, the number of pre-award publications and field of

[63] EAPSI awarded applicants were included only if they had completed their EAPSI fellowship by October 1, 2010.

study. Exhibits display the adjusted (estimated) means for awardees and non-awardees, the estimated impact, the standard error, and the p-value. For specifics on model specifications and standard error calculations, see Appendix C.

5.3.1 International collaborations

Exhibit 5.1 below shows the impact of the program on international collaborations, comparing the extent to which former fellows' engagement in international collaborations differs from that of unfunded applicants. Differences were investigated in the number of international postdoctoral fellowships, employment outside the U.S., engagement in work with individuals located in other countries, characteristics of work with individuals in other countries, publications with foreign collaborators, mentoring of individuals conducting research abroad, and activities to foster international collaborations.

Graduate students apply to EAPSI because they are interested in pursuing an international research experience. Several findings suggest that unfunded applicants continue to pursue other avenues for their international experiences. Among EAPSI applicants who held a PhD, EAPSI fellows and unfunded applicants held a similar number of international postdoctoral fellowships[64] (0.32 fellowships for EAPSI fellows versus 0.28 fellowships for the unfunded applicants; the difference was not statistically significant). Further, EAPSI fellows were less likely than unfunded EAPSI applicants to have been employed outside the U.S. (13 percent versus 39 percent, respectively), a statistically significant difference of 26 percentage points.

More fellows than unfunded applicants reported that they currently work with individuals located in other countries (40 versus 35 percent), although this difference was not statistically significant. Among those who work with a collaborator in a foreign country, fellows compared to unfunded applicants were less likely to report that their collaboration included joint publications or jointly developed products (82 percent versus 92 percent), a statistically significant difference.

Despite how individuals characterized their collaborations, EAPSI fellows' collaborations with foreign collaborators resulted in greater productivity as measured by publications. Fellows reported a higher number of publications co-authored with a foreign collaborator (on average, 2.2 publications for fellows and 1.6 publications for unfunded applicants), a statistically significant difference of .6 publications. Further, a larger proportion of the publications of fellows, than of unfunded applicants, include a foreign co-author (22 versus 17 percent), a statistically significant difference of 5 percentage points.

There was also evidence that the influence of the program extended beyond the immediate participants, as fellows were also more likely than unfunded applicants to engage in a series of activities to foster international collaborations among others (40 percent versus 30 percent, respectively), a 10 percentage point difference that was statistically significant.

[64] This included only postdoctoral fellowships abroad, thus international postdoctoral fellowships is a measure of internationalization, not of employment.

Exhibit 5.1: Comparison of Fellows and Unfunded Applicants on Career International Activities

Outcome	Awardee Adjusted Mean	Unfunded Applicants Adjusted Mean	Impact Estimate	Impact Standard Error	p-value
Work with individuals outside the U.S.					
Total number of international postdoctoral fellowships[a]	0.32	0.28	0.04	0.05	0.469
Employment outside the U.S. since [year marking end of fellowship period] [b]	0.13	0.39	-0.26**	0.04	<0.000
In current job, works with individuals located in other countries [c]	0.40	0.35	0.05	0.04	0.218
Type of current work with individuals in other countries includes joint publications and/or jointly-developed products [e]	0.82	0.92	-0.09*	0.05	0.040
Publications with foreign collaborator					
Number of publications co-authored with a foreign collaborator [d]	2.19	1.60	0.59*	0.25	0.016
Proportion of publications co-authored with a foreign collaborator [d]	21.94	16.65	5.29**	1.95	0.007
Fostering international collaboration					
Has mentored others from the U.S. traveling to another country to conduct research [b]	0.24	0.25	-0.01	0.04	0.764
Conducted activities to foster international collaboration [e]	0.40	0.30	0.10**	0.04	0.010

*p<.05, **p<.01, ***p<.001

EXHIBIT READS: EAPSI awarded applicants (who had completed their EAPSI fellowship by October 1, 2010) held more international postdoctoral fellowships then unfunded EAPSI applicants: 0.32 fellowships for EAPSI fellows versus 0.28 fellowships for the unfunded applicants (a difference of 0.04 fellowships); this difference was not statistically significant.

13 percent of EAPSI fellows had been employed outside the U.S. compared with 39 percent of unfunded applicants; this difference was statistically significant.

NOTES:

[a] Because this question was limited only to those who had completed a PhD by October 1, 2010 we did not use highest degree achieved by October 1, 2010 as a covariate in our model. N=471 (394 Awarded, 74 Unfunded Applicants); Missing=3. Answered by applicants whose highest degree completed as of October 1, 2010 was a doctoral degree.

[b] N=644 (528 Awarded, 116 Unfunded Applicants); Missing=13. Answered by applicants who were not enrolled in graduate school during the week of October 1, 2010.

[c] N=623 (507 Awarded, 116 Unfunded Applicants). Answered by applicants who were employed during the week of October 1, 2010

[d] N=875 (706 Funded, 169 Unfunded); Missing=97.

[e] N=633 to 635 (517 to 520 Awarded, 113 to 118 Unfunded Applicants); Missing=22 to 24. Answered by applicants who were not enrolled in graduate school during the week of October 1, 2010.

SOURCE: EAPSI Applicant Survey–Items D1b, D4, D4a, D4b, D6, D8, D10

5.3.2 Educational and Career Outcomes

While the program is not designed to directly affect education and career outcomes, an unintended consequence of participation might be delays in degree attainment or career progression resulting from the time spent conducting research abroad. The study did not find that educational progression was delayed, as fellows and unfunded applicants were equally likely to have obtained a master's degree (37 versus 38 percent) or a PhD as their highest degree (53 versus 48 percent) (no exhibit).Further, the research productivity of fellows and unfunded applicants, as measured by the number of their post-application publications, was similar (9.8 versus 9.5 publications, Exhibit 5.2).

Other career outcomes were specific to only small subsets of respondents, so findings should not be generalized to the larger group of respondents (Exhibit 5.2). Specifically:

- Among those who reported having received an award as a principal or co-principal investigator, EAPSI fellows were significantly less likely than unfunded EAPSI applicants to report that their self-identified most prestigious research grant, award, or honor was from an international organization or foreign government: 12 percent of EAPSI fellows versus 30 percent of the non-awardees.
- Among applicants who were employed at an institution of higher education, fellows were more likely to be in a position that involved research, 85 percent of fellows versus 71 percent of unfunded applicants, a statistically significant difference of 14 percentage points.
- Among those individuals who were employed at institutions with a faculty rank system, unfunded applicants were significantly more likely to be in a tenure track position (56 versus 40 percent).
- Among those individuals in institutions with a tenure track system, tenure rates were similar between the two groups (4 percent versus 3 percent).

Exhibit 5.2: Comparison of Fellows and Unfunded applicants on Career Outcomes

Outcome	Awardee Adjusted Mean	Unfunded Applicants Adjusted Mean	Impact Estimate	Impact Standard Error	p- value
All applicants					
Number of post-application publications [a]	9.83	9.51	0.32	0.85	0.709
Subset of applicants					
Most prestigious grant, award, or honor for research was from an international organization or foreign government [b]	0.12	0.30	-0.18**	0.05	0.001
Currently holds a research faculty, scientist, associate or fellow position at a 4-year college/university, medical school, or university-affiliated research institute [c]	0.85	0.71	0.14*	0.06	0.010
Currently has faculty rank of Assistant, Associate or Full Professor [d]	0.40	0.56	-0.16*	0.07	0.021
Currently has tenure [f]	0.04	0.03	0.01	0.05	0.829

*p<.05, **p<.01. ***p<.001

EXHIBIT READS: EAPSI awarded applicants (who had completed their EAPSI fellowship by October 1, 2010) on average had 9.8 publications since completing EAPSI versus 9.5 publications for the unfunded EAPSI applicants (a difference of less than 1 publication). This difference was not statistically significant. Note, the count of publication included peer-reviewed journal articles, peer-reviewed conference publications (e.g. abstracts, conference papers, posters, and book chapter(s)).

Among those individuals who reported receiving a research grant, award or honor, twelve percent of EAPSI awarded applicants (who had completed their EAPSI fellowship by October 1, 2010) reported that their most award was from an international organization or foreign government, as opposed to 30 percent of unfunded applicants. This difference was statistically significant.

NOTES:

[a] N=879 (709 Awarded, 170 Unfunded Applicants), Missing=93.

[b] N=291 (243 Awarded, 48 Unfunded Applicants); Missing=12. Includes applicants who had received grant(s) (as a principal investigator or co-principal investigator), prestigious awards or honors based on their research.)

[c] N=189 (151 Awarded, 38 Unfunded Applicants). Includes applicants who were employed at an educational institution during the week of October 1, 2010.

[d] N=148 (127 Awarded, 21 Unfunded Applicants). Includes applicants who were employed at an educational institution that has a faculty rank system.

[e] N=125 (104 Awarded, 21 Unfunded Applicants). Includes applicants who were employed at an educational institution with a tenure system.

SOURCE: EAPSI Applicant Survey–Items D2a, D2c, D2d, D5b, D6.

There were some differences in the types of employers of EAPSI fellows versus unfunded applicants. EAPSI fellows were less likely to be employed in an educational institution (50 percent of fellows versus 62 percent of unfunded applicants) and in state or local government (1 percent versus 6 percent); these differences were statistically significant.

Exhibit 5.3: Comparison of Employers of Fellows and Unfunded Applicants

Employed in	Awardee Adjusted Mean	Unfunded Applicants Adjusted Mean	Impact Estimate	Impact Standard Error	P-value
Educational Institution	0.50	0.62	-0.11*	0.05	0.024
Self Employed	0.04	0.01	0.03	0.02	0.097
Private Sector	0.31	0.22	0.08	0.05	0.062
State or Local Government	0.01	0.06	-0.04*	0.02	0.046
Federal Government	0.12	0.09	0.03	0.03	0.378
Other	0.01	-0.00	0.02	0.01	0.264

*p<.05, **p<.01, ***p<.001

EXHIBIT READS: 50 percent of EAPSI awarded applicants (who had completed their EAPSI fellowship by October 1, 2010) were employed at an educational institution, as opposed to 62 percent of unfunded applicants. This difference was statistically significant.

NOTES: N=599 (456 Awarded, 143 Unfunded Applicants), Missing=0. These items were answered by applicants who, during the week of Oct 1 2010, were working for pay or profit in a non-postdoctoral appointment. N

SOURCE: EAPSI Applicant Survey–Items D2 and D3.

5.4 Benchmark to National Data

To understand the EAPSI fellows' outcomes within a broader context, the outcomes of EAPSI fellows were compared to national estimates for science and engineering graduates. Specifically, the outcomes of EAPSI PhD graduates were compared against national estimates from the Survey of Doctoral Recipients (SDR), and the outcomes of EAPSI master's graduates were compared against estimates of individuals who had completed master's degrees in the National Survey or Recent College Graduates (NSRCG).[65]

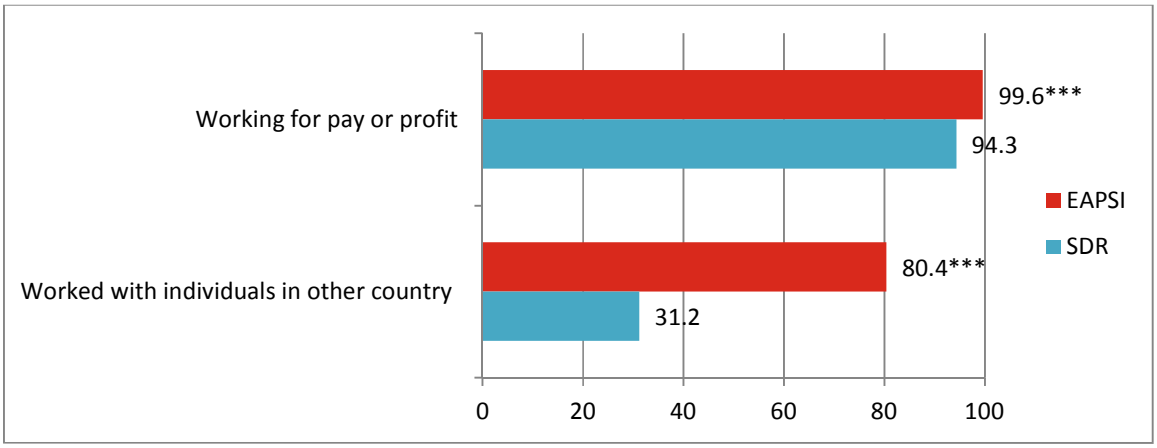
These comparisons are descriptive in nature and are not intended to address the impacts of the EAPSI program. Thus, findings should be interpreted with an understanding that there may be uncontrolled initial differences between EAPSI fellows and those who responded to the SDR and the NSRCG. Note that the EAPSI benchmarking estimates below are different from the EAPSI impact estimates above because the master's students and doctoral students are combined in the impact analyses above. Also, in the benchmarking analyses covariates are grand mean centered using the SDR and EAPSI samples (or the NSRCG and the EAPSI samples) versus impact analysis where the covariates are grand mean centered using the EAPSI sample only.

[65] Similar comparisons that compared both fellows and unfunded EAPSI applicants to national estimates are included in Appendix F.

5.4.1 Benchmark Comparison of EAPSI Fellows to National Samples

EAPSI fellows were compared to the national samples on the frequency with which they worked with individuals in other countries (Exhibit 5.4 and Exhibit 5.5). EAPSI PhD fellows were more likely to be working "for pay or profit" (almost 100 percent of EAPSI PhD awardees versus 94 percent of the SDR sample, a statistically significant difference). EAPSI fellows with PhDs were significantly more likely to be working with individuals in other countries, compared to their counterparts nationally (80 percent of EAPSI PhD fellows versus 31 percent of the SDR sample; a statistically significant difference).

Exhibit 5.4: Characteristics of Work of EAPSI Fellows and SDR Sample during Reference Week



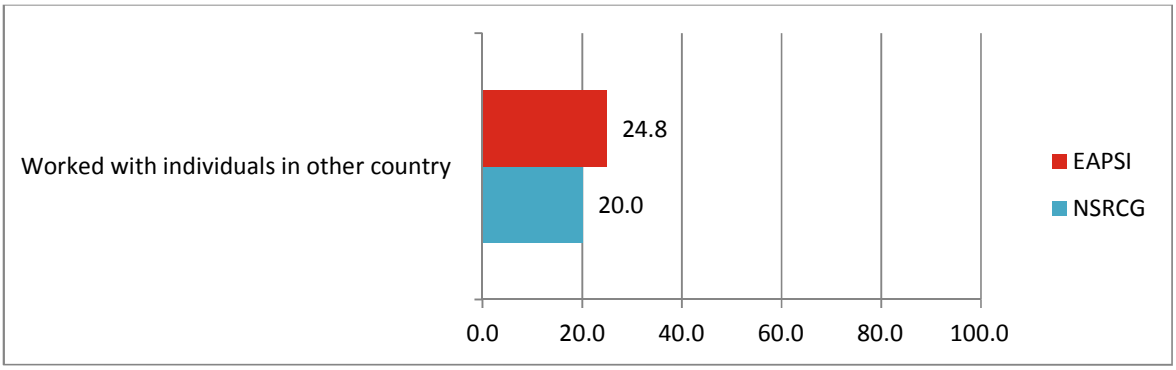
*p<0.05, **p<0.01, ***p<0.001

NOTES: *Currently employed:* This item was answered by former EAPSI fellows who had completed their EAPSI fellowship (including any U.S.-based "re-entry period") as of October 1, 2010 (N=503, Missing=0) and by SDR 2008 respondents who had completed a PhD by October 1, 2008 (N=29,974, Missing=0). *In current job, works with individuals in other countries:* This item was answered by former EAPSI fellows who had completed their EAPSI fellowship (including any U.S.-based "re-entry period") as of October 1, 2010 and were employed during the week of October 1, 2010 (N=497,Missing=0) and by SDR 2006 respondents who had completed a PhD by April 1, 2006 and were employed during the week of April 1, 2006 (N=27,119, Missing=0). This item was not included in the SDR 2008 wave.

SOURCE: EAPSI Applicant Survey–Items D1a, D1c, D2 and D4. SDR Survey 2006–Items A1 and A27

Fellows whose highest degree at the time of the survey was a master's degree were equally likely to be working with individuals in other countries compared to master's graduates in the NSRCG sample (25 percent of EAPSI master's fellows versus 20 percent of the master's NSRCG sample; not a statistically significant difference. Exhibit 5.5).

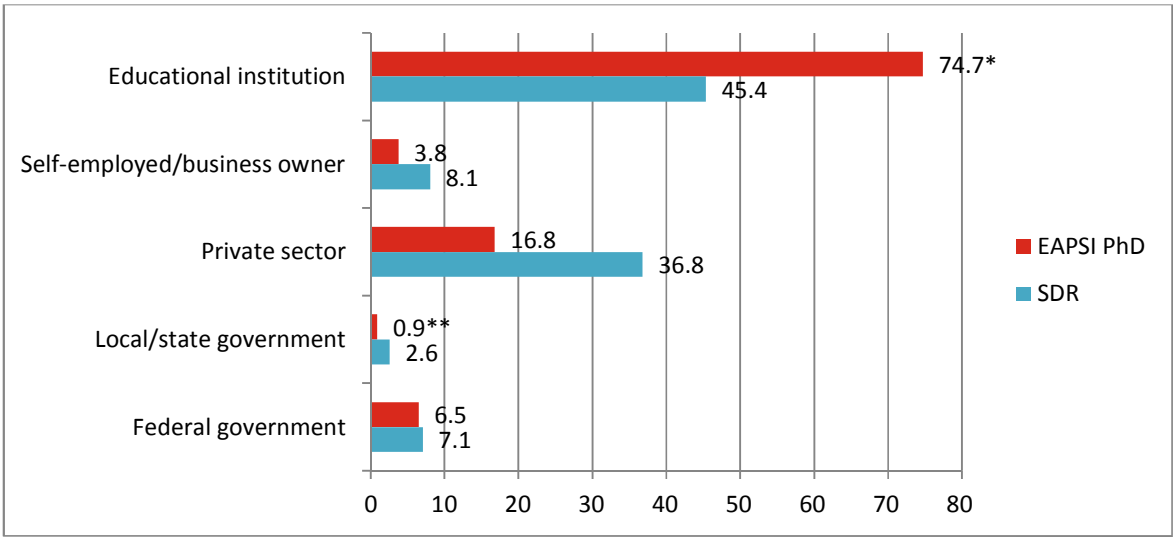
Exhibit 5.5: Characteristics of Work of EAPSI Master's Fellows and NSRCG Sample



NOTES: Reference week was October 1, 2010 for EAPSI fellows and April 1, 2006 for the NSRCG sample. The NSRCG sample excluded individuals living outside of the United States. Difference is not statistically significant at the p<.05 level. EAPSI N=149 Missing=0. This item was answered by fellows who as of October 1, 2010 had completed EAPSI; NSRCG N=3,973 Missing=0. This item was answered by NSRCG respondents who had completed a master's degree by April 1, 2006.
SOURCE: EAPSI Applicant Survey–Items D1a, D1c, and D4. NSRCG Survey 2006–Items B1 and B27.

Additional comparisons were conducted to investigate the differences in the work settings between EAPSI PhD fellows and national estimates for similar S&E graduates (Exhibits 5.6). EAPSI PhD fellows were more likely to be employed in an educational institution (75 versus 45 percent) and less likely in state or local government (1 versus 3 percent). EAPSI PhD fellows working at educational institutions were less likely, however, to be on a tenure track (31 versus 50 percent, data not shown).

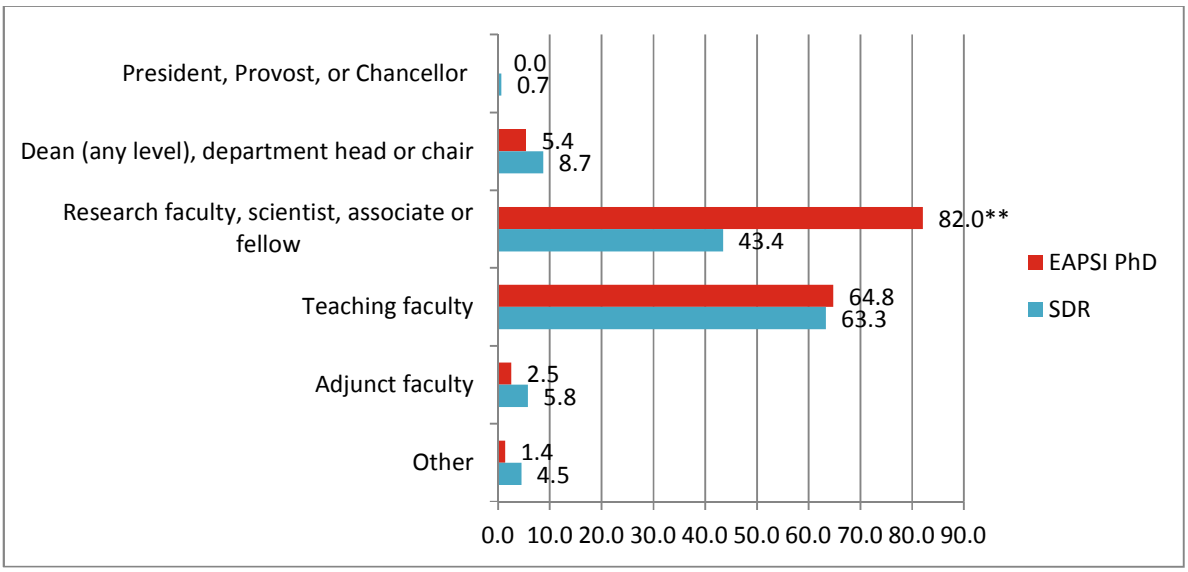
Exhibit 5.6: Employers of EAPSI PhD Fellows and SDR Sample during Reference Week



*p<0.05, **p<0.01, ***p<0.001
NOTES: This item was answered by EAPSI fellows who had completed their EAPSI fellowship, had earned a PhD, and were employed as of October 1, 2010 (N=378, Missing=0) and by SDR 2008 respondents who had completed a PhD and were employed during the week of October 1, 2008 (N=26,191, Missing=0). Items from which these data derive differed slightly between the EAPSI Applicant Survey and the SDR 2008; thus, Local Government (city, county, school district) and State Government (including state colleges/universities) were combined into a single category for both groups; and U.S. Federal Government and U.S. Military service, activity duty or Commissioned Corps (e.g., USPHS, NOAA) were combined.
SOURCE: EAPSI Applicant Survey–Items D1c, D2 and D3. SDR Survey 2008–Items A1, A11 and A12.

Among those working in institutions of higher education, EAPSI fellows were more likely to have research faculty/scientist/associate/fellow positions (82 percent of fellows versus 43 percent from the SDR sample, a significant difference) (Exhibit 5.7).

Exhibit 5.7: EAPSI PhD Fellows and SDR Samples' Positions in Academic Institutions



*p<0.05, **p<0.01, ***p<0.001

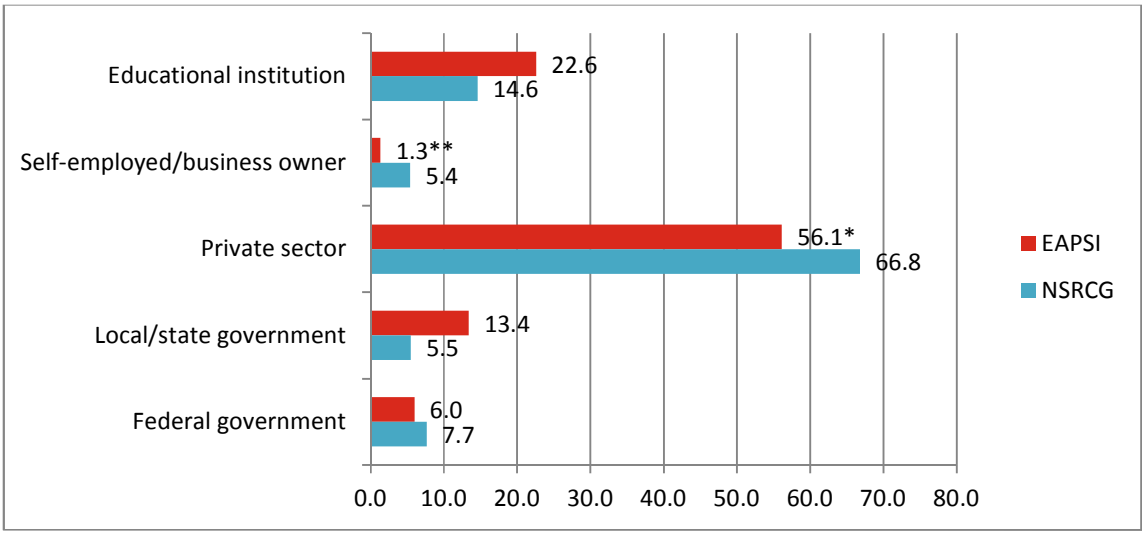
NOTES: The academic positions are not mutually exclusive: Individuals could select more than one response. For example, individuals could hold a research faculty position and a teaching faculty position simultaneously.

These items were answered by EAPSI fellows who had completed their EAPSI fellowship and had earned a PhD, were working at an educational institution (other than in a postdoctoral position) during the week of October 1, 2010 and who did not report working in a preschool, elementary, middle, or secondary school or system (EAPSI N=160, Missing=0) and by SDR respondents who had completed a PhD, who were working in an educational institution during the week of October 1, 2008, and who did not report working in a preschool, elementary, or secondary school system (SDR N=11,773, Missing=0).

SOURCE: EAPSI Applicant Survey–Items D1c, D2, D2a and D2c. SDR Survey 2008–Items A1, A12, and A14.

Similar comparisons of employers were performed for EAPSI fellows with masters' degrees. Fellows were significantly less likely to be self-employed or business owners (1 versus 5 percent) and less likely to be in the private sector (56 versus 67 percent) (Exhibit 5.8).

Exhibit 5.8: Employers of EAPSI Master's Fellows and NSRCG Sample during Reference Week



*p<0.05, **p<0.01, ***p<0.001

NOTES: Reference week was October 1, 2010 for EAPSI fellows and October 1, 2008 for the NSRCG sample. This item was answered by EAPSI awardees who had completed their EAPSI fellowship, whose highest degree earned was a master's degree and were employed as of October 1, 2010 (N=323, Missing=0) and by NSRCG respondents who had completed a master's degree and were employed as of October 1, 2008. (N=4,326, Missing=0). Items from which these data derive differed slightly between the EAPSI Applicant Survey and the NSRCG 2008; thus, Local Government (city, county, school district) and State Government (including state colleges/universities) were combined into a single category for both groups; and U.S. Federal Government and U.S. MILITARY service, activity duty or Commissioned Corps (e.g., USPHS, NOAA) were combined for both groups.

SOURCE: EAPSI Applicant Survey–Items D1c, D2 and D3. NSRCG Survey 2008–Items B1, B11 and B12.

5.5 Respondents' Perceptions of the EAPSI Outcomes

This last section contributes to a deeper understanding of the outcomes and benefits of the EAPSI program by exploring respondents' perceptions of the program. As described below, interviews with foreign officials identified a wide range of individuals and groups that benefit from the EAPSI program. Specifically, they identified benefits related to EAPSI fellows, their hosts, other individuals, and institutions. Survey respondents' perceptions of the benefits for each of these groups are then presented.

5.5.1 Foreign Managers and Agency Officials' Perceptions of Outcomes

Responses from the administrators of the EAPSI program at host locations provided useful information about the program. Interview respondents saw the program as benefiting multiple groups involved in the program, including the fellows, other students in the host lab or institution, the host researchers, and more broadly the institutions and countries as a whole.

For U.S. students participating in the program, most program managers emphasized the increased opportunities for collaboration and networking. Additional benefits mentioned included the opportunity to gain first-hand research experience and learn how research is conducted in a different country. As one respondent explained, "The program enables U.S. students to have firsthand research experience in [location] and promotes their collaboration with [location] counterparts in the future."

Respondents also described benefits enjoyed by host country students who interacted with EAPSI fellows. The program manager in one location felt that these students benefited from the presence of the fellow even more than the host researcher, as they were more directly exposed to new ideas and research approaches. An opportunity for the host country students to improve English proficiency was also noted by one of the managers.

Program managers and agency officials also identified benefits to hosts and other researchers who worked with the fellows. For example, hosting a U.S. student may allow hosts to learn about research, graduate training, and scientific developments in the U.S., and therefore gain a broader, international perspective on their research. EAPSI also allows hosts to establish relationships with U.S. advisors, which may serve to promote additional international research collaboration. As one respondent noted, "[EAPSI] helps to strengthen the link between the [location] hosts and the U.S. supervisors. Many times, the U.S. supervisor will come during the program. That relationship between senior researchers is initiated or strengthened. The host will subsequently go to the U.S. to work with the student or the supervisor."

Additionally, respondents discussed the benefits that institutions, and the countries as a whole, accrue by participating in the EAPSI program. Agency officials felt that participating in EAPSI allows them to cultivate good relationships with NSF and the U.S. One respondent commented, "The U.S. is an important bilateral partner, so increasing the relationship is great…. We also understand we need to be well connected internationally, so this is another program that helps us with this. This program supports [location's] international engagement." Further, some agency officials noted that participation in EAPSI facilitates research, which furthers the goals of the federal agency.

Program managers also described broader impacts. For example, they felt that the opportunity for increased collaboration, and the resulting exchange of ideas and information, may ultimately spur the development of international partnerships and improve their own educational programs and research agendas. For example, one respondent explained, "…having these foreign students come from different places with their own different perspectives is good for [location] in the sense that they can learn about how the U.S. educational system influences their students. They learn from students themselves, and this collaboration allows [location] to improve its own programs and get new ideas."

5.5.2 Survey Responders' Perceived Outcomes

These outcomes related to fellows, hosts, advisors and others were investigated through specific questions in the surveys. These survey findings are presented below.

5.5.3 Outcomes for Fellows

The surveys probed specific outcomes for fellows in the areas of educational and career opportunities, professional outcomes, and personal outcomes. As described below, the EAPSI program is perceived to have positive outcomes for fellows and to help prepare fellows for a variety of career opportunities and responsibilities.

Education and Career Opportunities

Overwhelmingly, fellows, hosts, and advisors perceive EAPSI as expanding the options and opportunities of participants, without limiting or negatively affecting educational and career trajectories. Among fellows who were no longer in school, the large majority (78 percent) responded that EAPSI had made them qualified for a broader range of opportunities, while less than 1 percent of individuals felt that EAPSI had constrained their opportunities.[66]

> *I am sure that my participation in the EAPSI program helped make my postdoctoral fellowship applications more impressive. It was great to have a letter of recommendation from an international leader in my field. Also, I wrote about the experience in my fellowship applications and how the EAPSI program helped me understand my commitment to science.* (EAPSI fellow)

Less than 1 percent of fellows felt their participation in EAPSI had resulted in a lost educational or career opportunity. Over 11 percent felt that EAPSI had delayed their degree completion.[67] However, graduation rates were similar for fellows relative to unfunded applicants. At the time of the survey, 71 percent of EAPSI applicants had earned the degree they were pursuing at the time of application to EAPSI, including 73 percent of EAPSI fellows and 68 percent of unfunded applicants.[68]

Negative outcomes or consequences of the program were reported by few individuals: 3 percent reported were being more skeptical about international collaboration now than before they had participated in EAPSI, and 2 percent reported that competition was introduced between their research group and the host.[69]

Similarly, negative outcomes were not commonly reported by advisors; 78 percent reported there were no negative outcomes as a result of the fellow's participation in EAPSI. Only 11 percent of advisors felt that the fellow's degree completion had been delayed; 7 percent reported that the fellow became distracted from important research; 2 percent reported the fellow had left the degree program, and 2 percent reported conflicts over intellectual credit for the research conducted at the host site. Less than 1 percent reported tension with other members of the home research group as a result of the fellowship.[70]

Respondents' descriptions of the outcomes of the program provide a deeper understanding of the benefits of the EAPSI program for fellows. For example, the following open-ended responses illustrate some of these benefits for EAPSI fellows:

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66 No exhibit. N=12 to 642, Missing=19 Awarded Applicants. Only fellows who reported that EAPSI did not broaden their opportunities (F2=2) responded to item F2b. *Source: EAPSI Applicant Survey–Items F2, F2b.*

67 No exhibit. N=633 to 639, Missing=22 to 28 Awarded Applicants. Source: *EAPSI Applicant Survey–Item F6.*

68 No exhibit. N=1303, Missing=0. Source: *EAPSI Applicant Survey–Item A5a.*

69 No exhibit. N=633 to 639, Missing=22 to 28 Awarded Applicants. Source: *EAPSI Applicant Survey–Item F6.*

70 No exhibit. N=639, Missing=5 Advisors. Responses do not sum to 100 because multiple responses were permitted. *Source: EAPSI Applicant Survey–Item D4.*

I learned valuable skills that my host is an expert in and in which I also am now an expert. This made me a more competitive candidate in the postdoctoral position I eventually took. (EAPSI fellow)

I believe the student returned in a much stronger intellectual position to pursue his graduate studies. The student acquired an international reputation among his peers, which has given him an established base/community at international meetings. (Advisor to EAPSI fellow)

Professional Outcomes

Surveys gathered information from the various respondent groups about the professional outcomes for fellows. Fellows identified benefits of participation that spanned various professional outcome areas (Exhibit 5.10). Among fellows who were no longer in graduate school, over half noted that they had made valuable connections to researchers outside the U.S. (52 percent) and that their participation had made them more competitive for jobs (51 percent). Other common professional benefits included becoming familiar with the scientific enterprise at the host site (42 percent) and considering additional professional opportunities they had not previously considered (40 percent).

I believe the EAPSI experience was invaluable to my career. It gave me a unique opportunity I may not otherwise have had. It has shown me that international collaboration can be very fruitful, especially in combining research expertise from my home and host labs. (EAPSI fellows)

Exhibit 5.10: Professional Benefits of Participation as Reported by EAPSI Fellows

	Fellows
I made valuable connections to researchers outside the U.S.	51.6%
EAPSI participation made me more competitive for jobs I was interested in	50.7
I became familiar with the scientific enterprise in my EAPSI site	42.1
EAPSI participation made me consider professional opportunities I would not have considered in the past	40.0
My work at the host institution opened up new areas of investigation	34.8
I became committed to international research collaboration	31.7
My work at the host institution resulted in a substantial advancement in my research	24.6
My career goals changed from an academic to a non-academic career	9.1
My career goals changed from a non-academic to an academic career	3.5
I decided to pursue a graduate degree in a different discipline than the one I was pursuing when I began my EAPSI fellowship	1.5
None of the above	7.0

NOTES: N=645Missing=16.
Answered by EAPSI fellows who were no longer enrolled in graduate school as of October 1, 2010. Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Item F3

Advisors were asked to rate the success of the program in helping fellows achieve several specific outcomes related to research and collaboration (Exhibit 5.11). A majority of the advisors reported that the program was successful (highly or somewhat) in helping fellows gain exposure to another country's research enterprise (86 percent), advance his/her research agenda (78 percent), establish

collaborations with a researcher outside the U.S. (75 percent), learning a technique or approach from the host (72 percent), foster long-lasting international collaborations (62 percent), and gaining access to resources or materials not widely available in the U.S (58 percent).

Exhibit 5.11: Advisors' Perceptions of Professional Benefits of EAPSI Program for Fellows

In your view, how successful was the program in helping the fellow achieve the following?	Highly Successful	Somewhat Successful	Somewhat Unsuccessful	Highly Unsuccessful	Do not Recall
To gain exposure to another country's research enterprise	67.1%	18.8%	0.9%	9.4%	3.8%
To advance his/her research agenda	50.2	27.4	7.2	11.4	3.8
To establish a collaboration with a researcher outside the U.S.	45.3	29.6	8.6	10.5	6.0
To learn a technique or an approach from the host scientist	39.5	33.2	8.8	8.0	10.4
To gain access to resources or materials not widely available in the U.S.	29.8	28.5	11.0	9.7	21.0
To foster a long-lasting international collaboration	26.1	36.2	15.9	11.7	10.1

NOTES: N ranges from 628 to 639, Missing ranges from 5 to 16.
SOURCE: EAPSI Advisor Survey–Item C2

Professional benefits specific to the relationships and research collaborations established during the fellowship were also investigated. Post-fellowship, 20 percent of fellows reported having collaborated on a research project with their former host, and an additional 60 percent had communicated with their host; only 21 percent had not communicated with their host.[71] Among those who reported collaborating with their host, 54 percent had collaborated within the past year, while it had been 3 years or more since the collaboration for 30 percent.[72] The collaborations most commonly consisted of co-authoring papers (72 percent) and exchanging ideas, data, research results or tools (67 percent).[73]

The following open-ended responses illustrate some of the professional benefits for EAPSI fellows:

> *My EAPSI experience has helped prepare me for working in an international environment. For example, I am more able to lead a group of engineers with backgrounds from all over the world because of my experiences in [country]. Also, I am more prepared to present my research in other countries because of my experiences in [country].* (EAPSI fellow)

[71] No exhibit. N=643, Missing=18 Awarded Applicants. *Source: EAPSI Applicant Survey–Item F1*.

[72] No exhibit. N=146, Missing=0 Awarded Applicants. Only fellows who collaborated with their host (F1=1) answered this item. Source: *EAPSI Applicant Survey, Item F1b.*

[73] No exhibit. N=146, Missing=0. Only fellows who collaborated with their host (F1=1) answered this item. Source: *EAPSI Applicant Survey, Item F1a.*

Participation in EAPSI gave me insight into how research was conducted in other countries. I was exposed to different research perspectives and processes. This exposure helped me to better understand the benefits and drawbacks of my existing research strategy. (EAPSI fellow)

*The project completed during the stay at my host institution became a publication in the [journal], the foundation for my successful [program] application, and the beginning of an ongoing collaboration (which was later further supported by a [program] Postdoctoral Fellowship). (*EAPSI fellow)

[The fellow] learned a specific technique from her host that would have been difficult to learn elsewhere, and this has helped increase the collaborative relationship - so much so that a PhD from the host lab will join my lab as an NSF-funded postdoc. (Advisor to EAPSI fellow)

Advisors also identified the interactions they had with fellows subsequent to their fellowship (Exhibit 5.12). Most commonly, advisors helped the fellow integrate the fellowship research into their research in the U.S. (63 percent), advised the fellow on work that continued what was begun during the EAPSI fellowship (57 percent), and assisted the fellow in preparing a presentation or publication on research conducted while at the host institution (51 percent).

Exhibit 5.12: Advisors' Interactions with Fellows upon Return to the U.S.

Upon the fellow's return to the U.S., which of the following were true?	Percent (N=641)
Helped the fellow integrate the research conducted at the host institution into their research conducted in the U.S.	62.7
Advised the fellow as he/she continues work begun during the EAPSI summer	56.5
Assisted the fellow in preparing a presentation and/or publication on research conducted at the host institution	51.0
Helped the fellow use the EAPSI experience to benefit his/her subsequent job search	42.3
Provided the fellow financial support to continue work on the research conducted during the EAPSI summer	41.3
Helped the fellow maintain a professional collaboration developed at the host institution	32.1
Helped the fellow to pursue additional international research opportunities	28.7
Other	3.1
None of the above	12.9

NOTES: Missing=3.
SOURCE: EAPSI Advisor Survey–Item C1

Personal Outcomes Reported by Fellows

EAPSI is designed to provide fellows with an orientation to the society, culture and language of the host site. Indeed, among the personal benefits noted were comfort with the traditions and culture of the host location and personal connections (Exhibit 5.13).

Exhibit 5.13: Personal Benefits of Participation as Reported by EAPSI Fellows

	Percent
I became comfortable with the traditions and culture of my host site	79.1
I made personal connections in the places I visited during the fellowship	77.9
I gained proficiency in another language	27.2
I decided to live outside the United States	17.7
None of the above	3.7

NOTES: N=645, Missing=16.
Notes: Answered by EAPSI fellows who were no longer enrolled in graduate school as of October 1, 2010. Responses do not sum to 100 because multiple responses were permitted.
SOURCE: EAPSI Applicant Survey–Item F5

Similarly, 64 percent of advisors felt that the program was highly successful in allowing the fellow to become familiar with the culture and traditions of another country, and an additional 19.1 percent thought the program was successful in this area.[74]

> *The EAPSI program allowed the establishment of an on-going collaboration between my lab and that of the U.S. graduate mentor. A peer-reviewed manuscript is under review at the moment from the work completed by the fellow (and the subsequent work by new members of my lab). I am organizing a visit to the U.S. lab by one of my current graduate students as part of this collaboration.* (EAPSI host)

5.5.4 Outcomes for Hosts

The EAPSI program also provided hosts with unique opportunities and occasions for professional gains. Hosting the EAPSI fellow was the first opportunity in which 38 percent of hosts worked with a U.S. graduate student.[75]

Hosts were asked whether they perceived any benefits accruing to themselves as a result of their participation in EAPSI (Exhibit 5.14). Most hosts identified some benefit; only 11 percent perceived no personal benefits from their participation. The most common benefits selected by respondents included enhanced interest in collaborating with U.S. researchers (31 percent), established or renewed collaborations with other U.S. researchers (30 percent), and published papers based on the collaborative research conducted (25 percent).

[74] No exhibit. N=640, Missing=4 Advisors. Source*: EAPSI Advisor Survey–Item C2.*

[75] No exhibit. N=658, Missing=7 Hosts. *Source: EAPSI Host Survey–Item E2.*

Exhibit 5.14: Hosts' Perceptions of Benefits from Participation in EAPSI Program

	Percent
Participating in the program enhanced my interest in collaborating with U.S. researchers	30.7
I established or renewed a collaboration with other U.S. researcher(s)	29.6
I published research papers based on the collaborative work with this EAPSI fellow	25.4
I learned new methodological/analytical techniques or theoretical approaches	20.8
I became more familiar with the research enterprise of the United States	20.8
I gave one or more presentations based on the collaborative work	19.1
Hosting a EAPSI fellow enhanced the recognition of my work by peers	14.0
Improved my English language skills	11.4
Participating in the program helped advance my career	8.8
Participating in the program helped me recruit other graduate students or postdoctoral fellows	8.7
Participation in the program changed the direction of some research projects in my group	7.1
I obtained access to resources not easily available at my institution/location	4.7
I obtained funding based on the collaborative work	4.3
Other benefits	8.1
None of the above	11.4

NOTES: N=658, Missing=7. Results do not sum to 100 percent because multiple choices were permitted.
SOURCE: EAPSI Host Survey–Item E2

Most hosts reported follow-up communications with the fellow after the fellowship. Specifically, 29 percent of hosts reported that they had collaborated further with fellows after the summer fellowship, 48 percent had communicated, but not collaborated with the fellows.[76] Among those who reported collaboration, 66 percent reported it had been within the past year, while 13 percent reported the collaboration was three or more years ago.[77] The collaborations most often included the exchange of ideas, data, research results or tools (77 percent) and co-authoring a research paper (64 percent).[78] On average, hosts reported one research publication resulting from their collaboration with the fellow.[79] Approximately one-quarter of hosts also reported collaborating with the EAPSI fellow's colleagues, for example former faculty advisors (27 percent).[80]

Open-ended responses also described benefits to the hosts and researchers in the host labs.

> *I spent a great deal of time educating the six graduate students in my host laboratory about our model organism, about how to apply for post-doc positions in the United States, about working in scientific laboratories in the United States, and about the culture of the United States.* (EAPSI fellow)

[76] No exhibit. N=654, Missing=11 Hosts. Source: *EAPSI Host Survey–Item D1.*

[77] No exhibit. N=192, Missing=0 Hosts. Only hosts who collaborated with the fellow (D1=1) answered this item. Source: *EAPSI Host Survey, Item D1a.*

[78] No exhibit. N=192, Missing=0 Hosts. Only hosts who collaborated with the fellow (D1=1) answered this item. Source: *EAPSI Host Survey, Item D1b.*

[79] No exhibit. N=565, Missing=100 Hosts. *Source: EAPSI Host Survey–Item D4.*

[80] No exhibit. N=661, Missing=4 Hosts. Source: *EAPSI Host Survey–Item D3a.*

It's nice to have a foreigner in the lab so that local graduate students can get a chance to interact with. Because of similar field that we studied, some scientific discussion and conversation were good for me as well as students in the lab. (EAPSI host)

5.5.5 Broader Reach

The evaluation also explored areas in which the influence of the program might extend more broadly to individuals associated with the direct participants in the program. Some fellows identified ways they perceived the experiences extended beyond the direct participants (Exhibit 5.15). Most commonly, they noted that their peers became interested in international collaborations (46 percent) and that research methods or ideas learned from the fellowship benefited others at their institution (37 percent).

Exhibit 5.15: Additional Benefits of EAPSI Participation that Extend Beyond Fellows

As a result of my participation…	Percent
My peers became interested in international collaboration	45.8
Research methods or ideas that I learned benefited others in my institution	37.0
Samples that I collected or tools that I developed benefited others in my institution	21.2
Others in my U.S. research group began an international collaboration	20.3
None of the above	19.5
Researchers that I met during my fellowship joined my research group	6.7
Other benefits not listed above	4.8

NOTES: N=645, Missing=16. Analysis only includes EAPSI fellows who were no longer enrolled in graduate school as of October 1, 2010. Results do not sum to 100 percent because multiple choices were permitted.
Missing=16 (Fellows).
SOURCE: EAPSI Applicant Survey–Item F4

EAPSI fellows reported sharing or engaging in activities that would extend the benefits of their experiences to others. Specifically, 59 percent reported sharing resources or tools collected or developed during the EAPSI fellowship, and 56 percent reported teaching colleagues, students, or peers research methods they had learned during EAPSI fellowship.[81] EAPSI fellows also reported engaging in some activities that might promote international collaborations among others. Specifically, 32 percent hosted researchers or professional colleagues from another country at their institution, 15 percent established a program to foster international collaborations, 12 percent have led a delegation of colleagues to visit a research laboratory, university, or business in

I think this program is an incredible opportunity for graduate students. It gives them the chance to learn about another culture, they learn new techniques and approaches, they develop potential future collaborations, and it makes them more competitive for jobs and postdocs. Many universities want undergraduates to have international experiences and I think this program prepares future faculty to lead international programs. (Advisor of EAPSI fellow)

[81] No exhibit. N=644-646, Missing=15 to 17 Awarded Applicants. *Source: EAPSI Applicant Survey–Item D9.*

another country, and 10 percent established or served in a leadership role for an international professional association.[82]

Another mechanism to promote international collaborations beyond those who were direct participants is for EAPSI fellows to mentor other individuals from the U.S. who conducted research abroad (Exhibit 5.16).Thirty percent of fellows reported mentoring individuals conducting research abroad, most commonly graduate students (20 percent), undergraduate students (13 percent), and postdocs (3.4 percent) among others.

Exhibit 5.16: EAPSI Fellows' Mentoring of Individuals Conducting Research Abroad

Fellows mentored…	Percent
Graduate students	20.4
Undergraduate students	12.8
Postdocs	3.4
Research scientists	2.3
Faculty	0.9
Other individuals	6.0
Did not mentor any individuals who conducted research abroad	69.8

NOTES: N=653, Missing=8. Results include only EAPSI fellows who were no longer enrolled in graduate school as of October 1, 2010. Results do not sum to 100 percent because multiple choices were permitted.
Missing=8 (Fellows).
SOURCE: EAPSI Applicant Survey–Item D8

Forty-four percent of advisors felt they were more likely to get involved in international research collaboration because of the EAPSI program, while 56 percent felt it had not affected the likelihood that they would engage in international collaboration; less than 1 percent stated it made them less likely to collaborate.[83]

Advisors also identified benefits that they or their research groups derived as a result of the EAPSI fellowship. Most commonly, they reported that the fellow's experience broadened their understanding of the research enterprise in the foreign country (60 percent), introduced new knowledge, approaches, or skills (57 percent), and raised the research group's visibility abroad (52 percent) (Exhibit 5.17).

[82] No exhibit. N=639-642, Missing=19 to 22 Awarded Applicants. *Source: EAPSI Applicant Survey–Item D10.*

[83] No exhibit. N=632, Missing=12 Advisors. *Source: EAPSI Advisor Survey–Item E7.*

Exhibit 5.17: Benefits for Advisors and Their Research Groups

	Percent
The fellow's experience broadened our understanding of research enterprise in the foreign country	59.8
The fellow introduced new knowledge, approaches, and/or technical skills	56.7
The fellow made my group and our research better known abroad	51.8
The fellow helped establish or maintain an important collaboration that has benefited my research/my groups research	41.3
We published papers which resulted from the fellow's participation in EAPSI	30.5
The fellow brought back samples or other materials unavailable or not easily accessible in the U.S.	25.0
The fellow's experience changed the direction of our research or added a new dimension to our research	20.7
Other	5.2
None of the above	9.5

NOTES: N=639, Missing=5. Results do not sum to 100 percent because multiple choices were permitted.
SOURCE: EAPSI Advisor Survey–Item D2

A large percentage of advisors (88 percent) of advisors reported that they currently collaborate with researchers in countries outside the U.S. Among these were the researcher who had hosted their former graduate student (40 percent), other researchers at the host location (39 percent) and researchers in other countries (92 percent). These collaborations spanned activities including co-authoring papers to sending students to work in each other's labs (Exhibit 5.18).

Exhibit 5.18: Nature of Advisors' Collaborations with Individuals outside U.S.

Collaboration	Percent With Host	Percent With Other Researchers in Host Country	Percent With Researcher in Other Foreign Countries
Co-author papers	34.1	27.4	75.3
Share data or information	34.1	31.4	73.3
Collaborate on a research project	28.9	29.0	78.7
We send our graduate students and/or postdoc fellows to work in each other's labs/sites	14.7	13.8	41.8
Co-sponsor professional conferences	9.5	12.7	38.0
Co-author patent/license applications	1.6	1.8	5.6

NOTES: N=558, Missing=1. Results do not sum to 100 percent because multiple choices were permitted. Results only include advisors whose response to F1=1 (indicating that they currently collaborate with researchers outside the U.S.
SOURCE: EAPSI Advisor Survey–Item F1b

These benefits for fellows' U.S. advisors and colleagues were described in open-ended responses:

> *She returned with a much broader worldview, global imagination, and an enthusiasm for field research that she communicated to other students.* (Advisor to EAPSI fellow)

> *We developed a strong and continuing collaboration with colleagues that my student worked with in [location]. We are still realizing benefits of this collaboration.* (Advisor to EAPSI fellow)

While in [location, the fellow] gave a couple of talks describing our group which increased our visibility in our field of study. The host was very impressed by [the fellow] and subsequently contacted me to seek whether I would be willing to send other students through this program. (Advisor to EAPSI fellow)

It helped establish a strong connection with host faculty member, which has endured and led to subsequent collaborations. It helped us learn about relevant research in [location] that was not widely available in the U.S., and it helped promote our own research to others abroad. (Advisor to EAPSI fellow)

5.5.6 Institutions

Respondents also reflected on whether EAPSI had broader effects that extended to institutions. Specifically, hosts were asked whether changes had taken place at their institutions as a result of their participation as an EAPSI host (Exhibit 5.19). Over half did not identify any changes (54 percent). Changes that were identified included: collaborations helped attract students or researchers to the institution (21 percent), colleagues increased collaborations with U.S. researchers (18 percent), and the department became more supportive of collaboration with U.S. researchers (13 percent).

International linkages and fellowships are, I think, an increasingly valuable means of sharing knowledge, moving research forward, and gaining perspective. I also think a small country that is isolated like [location] can benefit even more strongly from such interactions, and thus such programs have added value in that regard. (EAPSI host)

Exhibit 5.19: Changes at Host Institutions

	Percent
Collaborations with U.S. researchers helped attract students and other researchers to my institution	20.6
My colleagues increased their own collaborations with U.S. researchers	18.2
Administration in my department(or unit) became more supportive of collaboration with U.S. researchers	13.0
Additional policies, procedures, or structures have been put in place at my institution to facilitate international collaboration	8.7
Other	1.8
None of the above	53.8

NOTES: N=664, Missing=7. Results do not sum to 100 percent because multiple choices were permitted.
SOURCE: EAPSI Host Survey–Item E4

Among many of my interactions with the host institution, his stay under the support by NSF became one of the critical components for the host institution to establish its overseas operation office at [U.S. institution]. (Advisor to EAPSI fellow)

Advisors also reported whether they thought that there were changes in their department, as a result of the fellow's participation in the EAPSI program, in the 2-year period following the fellow's EAPSI experience (Exhibit 5.20.)

Exhibit 5.20: Changes in Advisors' Departments

	Percent
Graduate students became more interested in collaboration with international researchers	47.4
Collaborations with international researchers helped attract students, postdoc fellow, and other researchers	27.7
Collaborations with international researchers raised the prestige of the department	21.8
Graduate students in this department began collaborating with international researchers	17.8
Faculty in this department became more interested in collaboration with international researchers	17.2
Collaborations with international researchers helped bring additional funding to the department	12.1
Faculty in this department began collaborating with international researchers	11.4
Administrative policies, procedures, or structures in the department or institution were established to facilitate collaboration with international researchers	4.9
I do not recall	13.1
Don't know, I was no longer at the department	2.3
None of the above	22.5

NOTES: N=639, Missing=5. Results do not sum to 100 percent because multiple choices were permitted.
SOURCE: EAPSI Advisor Survey–Item E2

These benefits were also described in open-ended responses.

> *Other faculty and students were exposed to international collaborative research and the value of such research collaborations. We have currently applied for additional funding to help continue the current project as well as expand the project by integrating it with additional international collaborators.* (Advisor to EAPSI fellow)

> *The fellow's participation in the EAPSI's program increased awareness amongst graduate students in the program about the possibilities to pursue such opportunities and the benefits of pursuing them.* (Advisor to EAPSI fellow)

As discussed in the concluding chapter, the findings from the evaluation provide evidence that the EAPSI program is providing opportunities that align with its program model, and that lead to both intended and unintended benefits.

6 Conclusions

The evaluation of EAPSI examined the characteristics and motivations of EAPSI participants, the opportunities for professional and personal growth provided through EAPSI, and the professional outcomes related to the program. Findings from this study provide evidence that EAPSI is contributing to NSF's efforts to help develop an internationally competitive and globally engaged S&E workforce. Specifically, the evaluation found evidence that EAPSI is meeting its goals to:

- introduce U.S. graduate students to East Asia and Pacific S&E in the context of a research setting; and
- help students initiate scientific relationships that will better enable future collaboration with foreign counterparts.

> *This program … provides valuable cultural and research experiences for graduate students. This program is an excellent way to facilitate cultural exchange among students and good will between researchers from different countries. The College of Engineering at [U.S. institution] is strongly supportive of international collaborations among research faculty and students, and likes to highlight these opportunities for students. While I cannot say for sure that my graduate student's participation in the EAPSI program was directly responsible for the highly encouraging environment we have for international collaborations and student exchange, I have used it as a positive example of the benefits that such experiences can have for our graduate students.* (Advisor of EAPSI fellow)

The evaluation also found evidence of ancillary benefits of the program, which include orienting fellows to the host's society, culture, and language, and providing opportunities whose benefits extend beyond the EASPI fellows. Below, the program's progress toward its stated goals as well as its broader influences are summarized.

6.1 Introduce Students to East Asia and Pacific Science and Engineering Research

Research experiences that included collaborations with foreign scientists at their host sites were central to the fellows' EAPSI program experiences. The majority of EAPSI applicants did not have extensive academic and travel experiences outside the U.S. at the time of application. Thus, through the research opportunities, EAPSI introduced fellows to international experiences.

Reflecting the globalization of science, both home departments and host departments were generally supportive of international research. Both fellows and unfunded applicants reported being attracted to the program because it offered them an opportunity to enhance their skills and knowledge as a researcher. The fellowships provided opportunities for fellows to engage in research activities independently as well as collaboratively, and fellows reported being satisfied with the various aspects of their research and their interactions with their hosts. Overwhelmingly, EAPSI fellows would recommend the fellowship to other graduate students seeking an international experience.

Graduate students apply to EAPSI because they are interested in pursuing an international research experience. Several findings suggest that unfunded applicants continue to pursue other avenues for their international experiences. Among EAPSI applicants who held a PhD, EAPSI fellows and unfunded applicants held a similar number of international postdoctoral fellowships, and EAPSI fellows were less likely than unfunded EAPSI applicants to have been employed outside the U.S.

6.2 Initiate Relationships That Enable Future International Collaborations

A key goal of the EAPSI program is to help students initiate scientific relationships that will better enable future collaboration with foreign scientists. The evaluation provided evidence that the fellows initiate scientific collaborations during their fellowships and that fellows and advisors perceived the fellowships as expanding the opportunities available to fellows. Over half of the fellows indicated that their participation led to valuable connections to researchers outside the U.S., and the majority of host and fellows reported follow-up communications or collaborations after the fellowship had ended.

Fellows also continue productive working relationships with individuals outside the U.S. Although unfunded applicants, who work with a collaborator in a foreign country, were more likely than fellows to characterize their collaborations as ones that involved joint publications or jointly developed products, in actual products, fellows reported a higher number of publications and a higher proportion of their publications that were co-authored with a foreign collaborator, providing evidence that the EAPSI experiences lead to more productive international research collaborations.

6.3 Orient Fellows to Host Society, Culture, and Language

Applicants are also drawn to EAPSI in part because it provides an opportunity to learn about the society, culture, and language of host sites. Nearly all fellows reported participating in cultural and leisure activities while abroad, and a larger majority reported becoming comfortable with the traditions and culture of their host site.

Many fellows who went to locations where English is not a major language reported engaging in language training. Nonetheless, some fellows still reported challenges related to communication and language, although most hosts did not report challenges related to the lack of familiarity.

6.4 Extend Benefits Beyond EAPSI Fellows

The EAPSI fellowship experience and benefits also extend to researchers in the U.S. For example, during the EAPSI fellowships, about one-third of fellows reported that other researchers from their home institution became involved in the research project. They continue to promote international collaborations after they return to the U.S.; specifically, the evaluation found that fellows were more likely than unfunded applicants to engage in a series of activities to foster international collaborations among others.

Among the reasons that foreign locations gave for becoming involved in EAPSI were to increase research collaborations with the U.S. and to establish a research network and ongoing relationships

among scientists. Hosts, also, were drawn to EAPSI both by their interest in the research projects of the fellows, as well as the benefits they feel might accrue to their research groups in addition to themselves. Some pointed to specific benefits such as increased interest in collaborating with U.S. researchers and/or new or renewed collaborations with U.S. researchers.

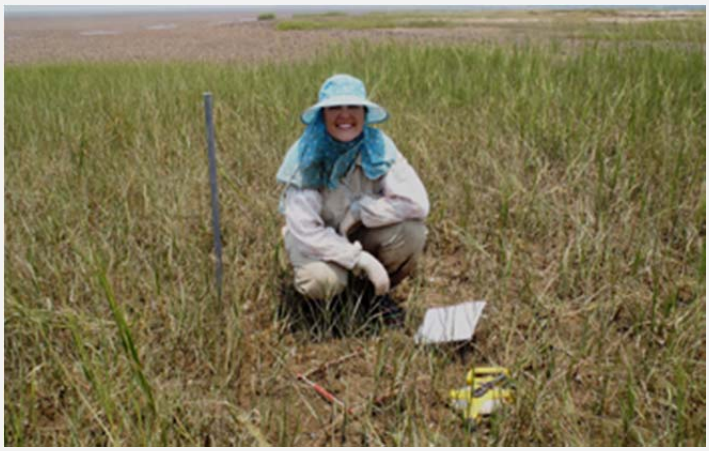
6.5 Conclusion

The evaluation demonstrated that individuals derive benefits from the program, both on an individual and a collective basis. EASPI fellows and hosts recommend the EAPSI program to their colleagues, and EAPSI U.S. advisors would also encourage additional students to participate. EAPSI offers graduate students an opportunity to conduct research in foreign locations and to establish relationships that they may build on subsequently in their careers. The experiences also extend beyond the specific participants and seed additional international S&E research activities. As such, EAPSI contributes to NSF's efforts to promote international S&E among early-career scientists and engineers.

Appendix A: NSF-Generated EAPSI Descriptions

Invasive Neighbors Disturb Taiwan's Coasts

University of Georgia student Virginia Schutte describes how a summer in Taiwan gave her the opportunity to get to the bottom of an invasive species problem in mangrove forests there



Virginia Schutte collecting data in the field on how the cordgrass invasion affects marsh fauna.

July 28, 2011

When I was offered a chance to study in Taiwan, I was very excited for the opportunity to do environmental research in a different part of the world. But, I was also nervous about living in Asia. My only experiences with Asian culture before visiting Taiwan came from eating Chinese food and watching people eat starfish on "The Amazing Race."

Would studying in a different environment be worth braving the unknown?

The answer, of course, is a solid yes. I received an East Asia and Pacific Summer Institutes (EAPSI) fellowship from the National Science Foundation (NSF) to study in Taiwan in the summer of 2010. EAPSI partnered with Taiwan's National Science Council to send 25 graduate students from the United States to Taiwan last year to foster international collaborations between the two countries.

My host was Hwey-Lian Hsieh of Academia Sinica in Taipei, Taiwan, who researches food webs--the energy and nutrient linkages between all the organisms in an ecosystem.

My own doctoral work focuses on forests of mangrove trees that live right on the edge of the ocean. For the EAPSI fellowship, my research linked our interests through a study of Taiwanese mangrove food webs that are being disrupted by an invasive species.

Invasive studies

Invasive species are important to study because they can alter the way that ecosystems work. The invaders disturb predator-prey dynamics, make native species less abundant and reduce native species biodiversity--changes that cause economic and environmental damage at sites worldwide.

In Taiwan, mangroves colonize coastal mudflats. Cordgrass grows in mudflats on the eastern coast of the United States, and decades ago, it was imported to China for aquacultural purposes. Cordgrass has since spread to Taiwan, where it is thriving despite eradication efforts.

The invasive species that scientists usually study compete directly with a similar native species, often causing the native species to die back. Unlike other invasive species, cordgrass does not replace or directly compete with native species in Taiwan--instead it occupies vacant mudflat space next to mangrove forests.

So I wanted to know: how does an invasive species affect neighboring native ecosystems?

Studying marshes

To answer this question, I focused on mudflat food webs. I put crabs and snails that normally eat mangrove materials into cages at the edge of the mangrove forest and provided them with food made from mangrove trees, cordgrass or both types of plants. The results will tell me whether those marsh animals prefer to eat food from mangroves or cordgrass, and how their diet in an invaded marsh will affect their growth and survival.

I also surveyed marshes around Taiwan to determine whether the animals' food preferences affect their foraging strategies. For example, if you're a crab living in the mangrove trees but you would rather eat cordgrass, will you change where and how you eat so you can get your favorite food?

I have many samples left to analyze, but I expect my results to show that the effects of an invader can reach beyond the borders of the invaded area to affect organisms next door.

The creatures that eat mangrove materials play an important role in mangrove ecosystems. They link plant materials and predators in coastal food webs, and their eating habits can influence the type and location of mangroves on mudflats. If marsh animals change the way they eat because of the cordgrass invasion, this could trigger changes in mangrove forests. The forests, when healthy, are a valuable source of food and provide humans with protection from storms on tropical coastlines.

Time in Taiwan

Studying in Taiwan not only advanced my scientific career, it also broadened my view of Asia. The best part of my EAPSI experience was that I didn't just sample some interesting food and landmarks the way a tourist would. I was introduced to the country as an insider because of the connections I had with my Taiwanese lab mates.

I went to a wedding, learned not to question the wisdom of ancient Chinese medicine, got to see parts of Taiwan that are not on tourist maps and discovered what it was like to be a typical Taiwanese student. Because of my host advisor and lab mates, Taiwan will forever be a special place for me.

I am a field ecologist and because I work outside, I can't create the environment I want to study. I have to study the environment that is already there. The EAPSI program gave me the opportunity to research a globally significant issue in a unique scientific setting. There are only a few places in the world where an invasive species has moved in as a neighbor to a native species without replacing it, and Taiwan was an ideal setting for a well-organized scientific study. Understanding how invaders can affect nearby ecosystems is an important step forward in preserving native communities and mitigating the effects of invaders all over the globe.

EAPSI let me connect with scientists abroad in a two-way exchange of scientific and cultural practices. Although I didn't try any starfish, I grew immensely, both professionally and personally, because of my experience.

--Virginia G. W. Schutte, Odum School of Ecology, University of Georgia, vschutte@uga.edu

This Behind the Scenes article was provided to LiveScience in partnership with the National Science Foundation.

Investigators
Virginia Schutte
Hwey-Lian Hsieh

Related Institutions/Organizations
University of Georgia
Academia Sinica, Taiwan

Locations
Georgia
Taiwan

Related Programs
East Asia and Pacific Summer Institutes for U.S. Graduate Students

Related Awards
#1015547 EAPSI: Do Climate Mediated Changes in Mangrove Biogeography Indirectly Influence Ecosystem Connectivity

Total Grants
$5,617

Related Websites
LiveScience.com Behind the Scenes: Invasive Neighbors Disturb Taiwan's Coasts:
http://www.livescience.com/15184-invasive-cordgrass-taiwan-marshes-nsf-bts.html
East Asia and Pacific Summer Institutes (EAPSI):
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5284

The Tasmanian Devil in the Wastewater

Arizona State University grad student Michelle Meighan on her experiences in Tasmania as a participant in NSF's East Asia and Pacific Summer Institutes program

Michelle Meighan feeds a kangaroo during her summer in Tasmania in 2009.

February 3, 2011

In the months leading up to the summer, a question that I frequently heard was "Tasmania? You're going to spend your summer in Africa?" Another popular comment was "You realize it's winter down there, right?" Yes, I was fully aware that I was "giving up" my summer (the 115 degrees Fahrenheit oven that is a Phoenix summer) for a somewhat colder climate, but no, I was not going to Africa.

Tasmania, or "Tassie," is a heart-shaped island south of mainland Australia. I was able to study in Tasmania through a fellowship provided by the National Science Foundation (NSF). NSF, in conjunction with the Australian Academy of Science, funded 20 American students to travel to Australia to facilitate our research here in the U.S. through the East Asia and Pacific Summer Institutes (EAPSI) program.

I worked with Michael Breadmore in the Australian Centre for Research in Separations Sciences (ACROSS) at the University of Tasmania. My research combined my dissertation work in counterflow electrophoretic separations (which involves analyzing substances based on how they flow through an electromagnetic field) with an ongoing electrokinetic supercharging project in Breadmore's lab.

Electrokinetic supercharging, although it sounds like a trait of a cartoon hero, is simply a method for using an electric field to concentrate substances for analysis.

Whereas my work at Arizona State University allows me to study proteins with a device developed in-house, my work with Breadmore took advantage of more powerful commercial instruments to study non-steroidal anti-inflammatory drugs (NSAIDs) in wastewater.

We chose NSAIDs--the technical term for a class of common, over-the-counter painkillers--because they are hard to eliminate from wastewater, which results in their release into the environment. Once in our waterways, NSAIDs have the potential to cause adverse health effects in both aquatic and terrestrial organisms.

In Breadmore's lab, a graduate student had recently finished his dissertation work on the electrokinetic supercharging technique. He was a tremendous help for my research and for tackling experimental difficulties.

The research results are aiding development of a technique for improving separations analyses, specifically a method that involves increasing pressure when chemicals of interest are injected into the electrophoresis system.

My work focused on experimental parameters--such as the various electrolytes and their concentrations, and the duration and magnitude of the potential applied--to effectively separate and concentrate various NSAIDs.

While successful, my experience was not only about research--I also "begrudgingly" fulfilled NSF's request for cultural experience.

Australia is an amazing country. I was fortunate enough to sit in on "Question Time" at the House of Representatives in the capital, Canberra, where I gained an appreciation of Australian politics. I also visited a wildlife reserve where I learned about the facial tumor that is rapidly killing the population of Tasmanian devils.

Thanks to television, I had believed that Tasmanian devils were brown, which is incorrect--they are black! Furthermore, while they don't spin in circles, they do make a hellish noise when feeding.

Of course, my cultural experience would not have been complete had I also not enjoyed a meat pie at an Australian Rules "Footie" game.

Participating in the EAPSI program was a truly remarkable experience. I was able to work with an amazing group of diverse colleagues and research a novel technique, all while immersing myself in the Australian culture. The opportunity to collaborate with Breadmore in the ACROSS program enabled me to learn a new research method, as well as gain a deeper understanding of electrophoretic separations through various interactions with researchers in the university's chemistry department.

Additionally, through a presentation of my dissertation work, I was able to engage in beneficial discussions with my Australian colleagues that have afforded me a fresh perspective on my research, applications and methodologies. The experience has been invaluable to my development both on a personal and professional level ... even if it wasn't in Africa.

-- Michelle M. Meighan, Department of Chemistry and Biochemistry, Arizona State University

This Behind the Scenes article was provided to LiveScience in partnership with the National Science Foundation.

Investigators
Michelle Meighan
Michael Breadmore

Related Institutions/Organizations
Arizona State University
University of Tasmania

Locations
Arizona
Australia

Related Programs
East Asia and Pacific Summer Institutes for U.S. Graduate Students

Related Awards
#0914228 EAPSI: Development of a Novel Electrophoretic Counterflow Separations Technique for Protein Analysis

Total Grants
$5,678

Related Websites
LiveScience.com: Behind the Scenes: The Tasmanian Devil in the Wastewater: http://www.livescience.com/culture/tasmanian-wastewater-bts-110118.html

My Research: I Burn Stuff

U.S. graduate student Abigail Watrous on her research studying energy technologies and seeking practical and affordable alternatives to help developing communities reduce pollution

A pile of coal in Gansu province, China. Coal use is exacerbating the country's pollution problem.

June 5, 2008

As a graduate student, explaining what you do for your research isn't always easy. For me, the long explanation is that I look at renewable energy technologies for developing communities, specifically options for cooking and heating in rural China. The larger purpose is to reduce carbon dioxide (CO_2) emissions and improve human and planetary health.

Some people think this is cool, while for others, their eyes glaze over pretty quickly. So, while my brother David was visiting me in Beijing this past summer, he came up with a more concise explanation: "You burn stuff."

This is actually almost true. Rather, about 700 million people (that's more than twice the population of the United States) living in rural areas of China, burn stuff. The "stuff" they burn can be straw, rice husks, corn husks, corn cobs, wood or coal. Everything except coal, that is, everything organic, is characterized as biomass, which is considered a renewable resource.

Coal is non-renewable and, when burned, creates high levels of CO_2 emissions--bad news. Unfortunately, biomass, while renewable, can also create harmful emissions and particulate matter, if burned in certain ways.

While farmers in the past used biomass to a great extent, the use of coal in rural areas in China is increasing. China is already struggling with significant air pollution, and the increased emissions from rural coal use only exacerbate the problem. However, coal is one of the least expensive energy options, so if we'd like farmers to use biomass in a sustainable way, we need to make sure that it is equal to or less than the price of coal.

Part of my research looks at trying to find the most practical, effective and affordable way for rural families in China to use biomass (for cooking and heating their homes), without having harmful effects on their health or the health of our planet.

I spent last summer in Beijing as a National Science Foundation (NSF) East Asia and Pacific Summer Institute (EAPSI) Fellow, and had the great privilege of conducting research at Tsinghua University for eight weeks. I had planned before coming to Beijing to stay for a full year, so I am continuing my research here and will be in China until just after the start of the 2008 Olympics.

The EAPSI program was a fantastic way to begin my China adventure. I got to meet about thirty other graduate students from all over America, all of whom were studying different topics, and we had a blast exploring Beijing together, practicing Chinese and talking about our extremely varied research interests. I'm continuing to work at Tsinghua, and have loved getting to know the Chinese graduate students in the rural energy research group here. I'm thankful for my advisors, the EAPSI program (which gave a great start to my year in this amazing country) and my brother, who gave me a whole new way to explain what I do!

-- Abigail Watrous, Tsinghua University and University of Colorado at Boulder abby.watrous@gmail.com

This Behind the Scenes article was provided to LiveScience in partnership with the National Science Foundation.

Investigators
Abigail Watrous

Related Institutions/Organizations
Tsinghua University
University of Colorado at Boulder

Locations
China
Colorado

Related Programs
East Asia and Pacific Summer Institutes for U.S. Graduate Students

Related Awards
#0714529 NSF East Asia Summer Institutes for US Graduate Students

Total Grants
$4,579

Related Websites
LiveScience.com: Behind the Scenes: My Research: I Burn Stuff: /news/longurl.cfm?id=109

40 Million Electric Bikes Spark Environmental Dilemma in China

Engineering professor Christopher Cherry reports on his study of the impact of electric bikes in China

This scene from a parking lot in China drives home the growing popularity of e-bikes.

January 24, 2008

Grace Zhang is like many other Chinese women. She is a middle-aged business owner, mother of a young daughter and one of more than 40 million new users of the electric bike, or e-bike, in China. Zhang is among China's emerging and rapidly motorizing middle class, riding China's economic growth. She leads a busy life between operating an English school, transporting her child and shopping; her day is full of activity. Her daily activities require high levels of flexibility and mobility, needs met by her new e-bike.

Electric bike users have taken Chinese cities by storm, quickly outnumbering cars and in many cities, bicycles.

Electric bikes range in style from traditional pedal bicycles powered by an electric motor to larger electric-powered scooters. They are loosely restricted on speed and size, but given the same rights as bicycle users, operate in bicycle lanes and do not require driver's licenses, vehicle registration or helmet use.

Good or bad?

Proponents would suggest that the e-bike phenomenon is a positive development; after all, e-bikes are quiet, non-polluting and provide more mobility than any other mode of transportation.

Opponents, however, charge that e-bikes are unsafe, increase congestion and indirectly pollute the environment through increased power plant emissions and lead pollution from the vehicles' heavy batteries. Several cities have attempted to, or successfully, banned electric bikes from roadways, including the mega-cities of Beijing and Guangzhou.

Still, there has been little research on the true impacts of electric bikes in China.

As a doctoral student in civil and environmental engineering at the University of California, Berkeley, I began conducting research, which led to a dissertation, on quantifying the impacts of electric bikes in China. I participated in the National Science Foundation's inaugural East Asia and Pacific Summer Institute (EAPSI) in China during the summer of 2005, and with support from the Volvo Foundation, I used this experience to examine several of the contentious issues surrounding electric bikes, including their seemingly negative impacts on the environment and safety, countered by their mobility benefits that allow access to jobs, shopping and health care opportunities.

Filling a niche

Chinese cities are expanding and becoming more congested as new personal automobiles fill the scarce roadway capacity. With a long legacy of bicycle use, Chinese commuters are accustomed to personal mobility and short trips. Trips are getting too long for bicycles and public transit services are often incapable of serving populations in cities with disorganized urban development patterns while competing with cars for road space.

Electric bikes have filled the niche, providing high levels of personal mobility at a fraction of the cost of a car or even public transit.

I found that electric bikes travel about 35 percent faster than bicycles and have a much larger range. In the city of Kunming, an electric bike can provide access to 60 percent more jobs within 20 minutes than a traditional bicycle. Compared to a 30-40 minute bus ride, an electric bike rider can access three to six times the number of jobs.

While this increase in mobility is remarkable, this mobility does come at a cost--namely increased lead pollution from battery use.

The environmental price

Electric bikes use one car-sized lead acid battery per year. Each battery represents 30-40 percent of its lead content emitted to the environment in the production processes, resulting in about 3 kilograms of lead emitted per battery produced. When scaled up the 40 million electric bikes currently on the roads, this is an astonishing amount of lead emitted into the environment.

This negative environmental impact is countered by other environmental benefits compared to most modes, including vastly reduced energy use and greenhouse gas emissions.

Ultimately, the success or failure of electric bikes as a sustainable mode of transportation should be evaluated in the context of the extent to which they displace automobiles. The e-bikes certainly have fewer negative impacts than personal automobiles, but currently displace mostly bus and bicycle users and only a small number of car users.

As China motorizes, will electric bikes displace would-be car users or simply provide a stepping stone to full blown auto ownership? They will likely lead to both outcomes. To the extent that electric bike battery technology and production processes improve, electric bikes provide some of the highest mobility and access to an urban area with some of the lowest negative impacts to the transportation system or the environment.

-- Christopher Cherry, (865) 974-7710 cherry@utk.edu, Assistant Professor of Civil and Environmental Engineering at the University of Tennessee-Knoxville

This Behind the Scenes article was provided to LiveScience in partnership with the National Science Foundation.

Investigators
Christopher Cherry

Related Institutions/Organizations
University of California-Berkeley
University of Tennessee-Knoxville

Locations
California
Tennessee
People's Republic of China

Related Programs
East Asia and Pacific Summer Institutes for U.S. Graduate Students

Related Awards
#0513291 NSF East Asia Summer Institutes for US Graduate Students

Total Grants
$3,000

Related Websites
LiveScience.com: Behind the Scenes: 40 Million Electric Bikes Spark Environmental Dilemma in China: /news/longurl.cfm?id=79
East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI): /news/longurl.cfm?id=80
Office of International Science and Engineering (OISE): http://www.nsf.gov/div/index.jsp?div=OISE

At the Crossroads of Stem Cells and Computer Science

A Rutgers University graduate student takes readers on a journey from Piscataway, New Jersey, to Hsinchu, Taiwan, and shares some experiences with East-West collaboration, stem cell sorting and computer science

Mike Wininger at the Industrial Technology Research Institute, Hsinchu Xian, Taiwan.

March 20, 2008

My blonde hair, blue eyes and size 15 running shoes weren't the only reasons for which I was a unique attraction at the Industrial Technology Research Institute in Hsinchu Xian, Taiwan. My background in physics and mathematics meant that I was the only member of Dr. Wannhsin Chen's Stem Cell Engineering Group who had no experience culturing human embryonic stem cells.

I had come to the institute's bioengineering division as an East Asian Pacific Summer Institute summer fellow, having come from Rutgers University in New Jersey where I'm a Ph.D. student and fellow of the National Science Foundation's (NSF) Integratively Engineered Biointerfaces program. I had received cutting-edge instruction for the culturing of cells, but my experience was limited to very hardy cell lines from epithelial tissues (surface cells), and my approach to cultures was more engineering than biomedical.

However, in Taiwan, my mentors were all biologists and would only mentor me as a student of biology. They were very forgiving of my utter lack of Chinese language skills, but they were much more insistent that I speak "biolog-ese." Nevertheless, the work was everything that I had been trained to do at the university--to be able to interface with the researchers in the basic sciences, and to synthesize the experience within the universe of biomedical engineering.

Part of the magic of modern tissue research is just how deftly an experienced biologist can look at an image of cells in a dish and know immediately which cells are healthy or not, differentiated or not. These qualitative--and in both labs, uncannily accurate--assessments not only confound the former physicist/entry-level culturist, but also place a concrete limit on the number of cells that can be evaluated in a day, and require valuable human resources--resources that periodically become susceptible to inaccuracies, affected by factors such as long days, nearing lunch hours or the hustle-and-bustle of a busy lab environment.

Merging statistical pattern recognition and computer vision to cell imaging, I am addressing the problem of cell sorting with novel quantitative methods. By processing hundreds of cell images and extracting salient parameters of cell size, morphology and structure, I seek to rigorously and objectively determine a stem cell's status. Experimental purity dictates that I devise my algorithm "blinded," i.e., on cell images generated by my mentors without my involvement, which is probably for the better: their cells were markedly more photogenic than mine (the only trustworthy qualitative statement this amateur can make!).

When I am finished, a computer will be able to acquire, save, filter and scan cell images, and process them for an online categorization, cell-by-cell (freeing the biologists to spend their workday innovating). The idea is either to automate the cell sorting process, increasing the through-put of cell passage, or to complement the biologist's subjective assessments. These principles underlie a number of fields of biomedical study, including automated diagnostics, pharmoaco-theraputics and even forensics.

Biology and math weren't the only things I learned during my tenure in Taiwan. I learned a lot about myself, about academia outside of the United States and about the Taiwanese people. For many of the summer fellows, it was our first time out of the country. But the training staff in Taiwan made us feel at home from the minute we arrived.

I saw the experience as an opportunity to reinvent myself as a scientist. In my round trip from Piscataway, New Jersey, to Hsinchu, Taiwan, I departed from my hometown of biomedical engineering and landed at the crossroads of stem cell biology and computer science.

-- Mike Wininger, Rutgers University wininger@eden.rutgers.edu

Editor's note: This graduate student has been funded as a NSF Integrative Graduate Education and Research trainee (IGERT) and received funding through the East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI). The experience described is integral to the purpose of helping graduate students be globally aware and competitive.

This Behind the Scenes article was provided to LiveScience in partnership with the National Science Foundation.

Investigators
Mike Wininger

Related Institutions/Organizations
Industrial Technology Research Institute, Hsinchu Xian, Taiwan
Rutgers University New Brunswick

Locations
Taiwan
New Jersey

Related Programs
Integrative Graduate Education and Research Traineeship Program
East Asia and Pacific Summer Institutes for U.S. Graduate Students

Related Awards
#0714444 NSF East Asia Summer Institutes for US Graduate Students
#0333196 IGERT: Integrative Education and Research on Biointerfacial Engineering

Total Grants
$3,750,960

Related Websites
LiveScience.com: Behind the Scenes: At the Crossroad of Stem Cells and Computer Science: http://www.livescience.com/health/080111-bts-stem-cells.html
What is a Stem Cell?: /news/longurl.cfm?id=33

Top 10s: Top 10 Mysterious Diseases: http://www.livescience.com/health/top_10_diseases.html
Biotechnology Information: http://www.livescience.com/biotechnology/

Appendix B: Non-Response Bias Study

This appendix describes the non-response bias study conducted for the applicant survey. First, it describes the two types of missing data. Next, it describes the analytic approach for addressing each type of non-response.

Types of Missing Data

There are two types of missing data that can arise in a survey, even after repeated attempts to collect data: (1) unit non-response, and (2) item non-response. The approach to dealing with each of these in this study is described below.

Unit Non-Response

Unit non-response occurs when an entire data instrument is not received from a potential respondent. Because non-response was greater than 10 percent, available data were used to explore whether results might be affected by non-response bias. Large differences in the response rates for subgroups could indicate that potential biases may exist[1]. For example, if the response rate from women was very low, and women were less likely to belong to the treatment group, then any observed difference in the outcomes between the treatment and comparison groups could potentially result in a biased estimate of the impact of the treatment. Exhibit B.1 shows the variables used in this analysis. Exhibits B.2 to B.4 shows the response rates by groups suggesting that there were differences in response rates by subgroups.

[1] Note that a large non-response rate does not necessarily create bias. For example, if the non-respondents were similar across the treatment and comparison group, then the impact estimate would not be biased necessarily; rather, any effect of the program could not be generalized to the non-respondents (i.e. it would create an external validity problem but not necessarily an internal validity issue).

Exhibit B.1: Variables Used in Non-Response Analysis

Variable	Variable Name	Values	N (%)
Gender	Cr_nrbias_gender	0=Male 1=Female	1187 (57.23) 887 (42.77)
Under-Represented Minority	Cr_nrbias_URM	0=Non-Minority 1=Minority 2=Missing	1494 (72.03) 234 (11.28) 346 (16.68)
Disability Status	Cr_nrbias_hdcap	0=Non-Disabled 1=Disabled 2=Missing	1602 (77.24) 17 (0.82) 455 (21.94)
Cohort	nYear_App_group	1=2000-2005 2=2006+	841 (40.55) 1233 (59.45)
Award Status	Nfinalawdfin	1=Awardee 0=Decline	1283 (61.86) 791 (38.14)
Proposal Score	Finalscore	1-5	Min = 0.00[2] Max = 5.00 Mean = 3.69 Std = 0.86 N = 2071

Examining Response Rates Overall

Exhibit B.2: Response Rates by Subgroups of Interest.

Characteristic	% Responding (n)			p-value
Gender	**Males** 62.01 (736)	**Females** 64.15 (569)	**Missing** --	0.3173
Under-Represented Minority	**Non-URM** 74.36 (1111)	**URM** 69.66 (163)	**Missing** 8.96 (31)	<0.0001**
Disability Status	**Non-Disabled** 78.78 (1262)	**Disabled** 52.94 (9)	**Missing** 7.47 (34)	<0.0001**
Award Status	**Non-Awardee** 46.14 (365)	**Awardee** 73.11 (938)	**Missing** 46.14 (365)	<0.0001**
Application Cohort	— —	**2000-2005** 60.17 (506)	**2006+** 64.80 (799)	0.0319*
Average Proposal Score	**Non-Responders** 3.4143	**Responders** 3.8573	**Missing** --	<.0001**T

*p<0.05, ** p <0.01 , *** p<0.001

NOTES: Unless otherwise specified p-values are from a 2X2 chi-square test of the null hypothesis of no association between participation and the characteristic of interest (1 degree of freedom).

T p-value is from the Student's T-Test

[2] The dummy imputation method was used to impute for 3 missing proposal scores. The missing cases were set to a constant (0) and added a missing data flag" to the propensity to respond model. The coefficient on the dummy variable measures how far off the imputation was from what would be expected based on the non-missing values; it was assumed the missing data is MCAR.

Examining Response Rates by Award Status

Exhibit B.3: Response Rates by Subgroups of Interest Controlling for Award Status.

Characteristic		% Responding (n)	p-values 2X2 Chi Square	p-values Award Status CMH
Gender				
Non-Awardee	Male	43.38 (190)	.0823	0.1343
	Female	49.58 (175)		
Awardee	Male	72.63 (544)	.6463	
	Female	73.78 (394)		
URM				
Non-Awardee	Non-URM	56.98 (298)	<0.0001**	<0.0001**
	URM	56.70 (55)		
	Missing	7.02 (12)		
Awardee	Non-URM	83.73 (813)	<0.0001**	
	URM	77.37 (106)		
	Missing	10.86 (19)		
Disabled				
Non-Awardee	Not Disabled	63.73 (355)	<0.0001** F	<0.0001**
	Disabled	25.00 (2)		
	Missing	3.54 (8)		
Awardee	Not Disabled	86.70 (906)	<0.0001**	
	Disabled	66.67 (6)		
	Missing	11.35 (26)		
Application Cohort				
Non-Awardee	2000-2005	38.74 (86)	0.0091**	
	2006+	49.03 (279)		
Awardee	2000-2005	67.69 (419)	0.016*	
	2006+	78.16 (519)		

Proposal Score	Mean Score Non-Responders	Mean Score Responders	p-value
Non-Awardees	2.93	3.13	0.0004**T
Awardees	3.98	4.14	0.0003**T,U

Missing values are assigned their own level.

*p<0.05, ** p <0.01 , *** p<0.001

NOTES: Unless otherwise specified p-values are from a 2X2 chi-square test of the null hypothesis of no association between participation and the characteristic of interest (1 degree of freedom).

F p-value is from the Fisher's Exact Test

T p-value is from the Student's T-Test

U Unequal variances assumption used for Student's T-Test

The column labeled "Award Status CMH" shows the p-values from Cochran-Mantel-Haenszel tests of the null hypothesis of no common participation effect across award status.

Examining Response Rates by Application Cohort

Exhibit B.4: Response Rates by Subgroups of Interest Controlling for Application Cohort.

Characteristic		% Responding (n)	p-values: 2X2 Chi Square	p-values: Application Cohort CMH
Gender				
2000-2005	Male	61.01 (313)	0.4744	0.3448
	Female	58.54 (192)		
2006+	Male	62.46 (421)	0.0685	
	Female	67.44 (377)		
URM				
2000-2005	Non-URM	77.84 (432)	<0.0001**	<0.0001**
	URM	69.41 (59)		
	Missing	6.97 (14)		
2006+	Non-URM	72.31 (679)	<0.0001**	
	URM	68.46 (102)		
	Missing	11.72 (17)		
Disabled				
2000-2005	Not Disabled	81.68 (477)	<0.0001**F	<0.0001**
	Disabled	80.00 (4)		
	Missing	9.52 (24)		
2006+	Not Disabled	77.01 (784)	<0.0001**	
	Disabled	33.33 (4)		
	Missing	4.93 (10)		
Award Status				
20001-2005	Non-Awardee	38.74 (86)	<0.0001**	<0.0001**
	Awardee	67.69 (419)		
2006+	Non-Awardee	49.03 (279)	<0.0001**	
	Awardee	78.16 (519)		

Proposal Score	Mean Score Non-Responders	Mean Score Responders	p-value
2000-2005	3.45	3.88	<0.0001**T,U
2006+	3.36	3.84	<0.0001**T,U

Missing values are assigned their own level.
*p<0.05, ** p <0.01 , *** p<0.001
NOTES: Unless otherwise specified p-values are from a 2X2 chi-square test of the null hypothesis of no association between participation and the characteristic of interest (1 degree of freedom).
F p-value is from the Fisher's Exact Test
T p-value is from the Student's T-Test
U Unequal variances assumption used for Student's T-Test
The column labeled "Application Cohort CMH" shows the p-values from Cochran-Mantel-Haenszel tests of the null hypothesis of no common participation effect across application cohort.

To address the potential for bias, the probability of a person responding to the survey both for responding and non-responding individuals was estimated as a function of baseline characteristics that were available for both types of individuals (e.g. proposal score, cohort year, gender), and created weighting classes for adjusting the weights of responding individuals to alleviate the bias due to non-response. Steps 1-4 described below were taken to accomplish this task.

Estimating Probability of Response

Step 1: Fit Models

Logistic regression models were fit to estimate the probability of a person responding to the survey. The response (dependent) variable is a dummy variable that took the value "1" for responding applicants and took the value "0" for non-responding applicants. The explanatory (independent) variables are the variables described in Exhibit B.1. Models also included all two-way interaction terms of award status/application cohort with the other variables described in Exhibit B.1.

Several models were fit to identify the set of explanatory variables that have statistically significant associations with the dependent variable ($p<0.20$ criterion) after controlling for other statistically significant control variables. This was accomplished by using backwards elimination with forward checking. [3] In this method, all of the explanatory variables are entered as predictors in the logistic regression model. The explanatory variable with the largest non-significant value is dropped from the subsequent model. This step is repeated until the only explanatory variables that remain in the model are those that meet the $p<0.20$ criterion. In the forwards checking step, each of the previously eliminated control variables is checked by adding each one to the model with only the significant predictors. In this step, each variable has a chance to get back into the model. The final

[3] Backwards elimination methods are attractive from the point of view that they are often used and familiar. But use of this method with the conventional $p<0.05$ criterion has been criticized from the point of view that the selection criteria tend to favor covariates with strong relationships to the outcome, but may omit important confounders (i.e., variables that have a weaker relationship to the outcome, but have a strong relationship to the predictor variable of interest). Maldonado and Greenland (1993) evaluated a backwards elimination strategy and a change-in-estimate strategy using simulated data from a poisson regression model. They found that the p-value based method performed adequately when the alpha levels were higher than conventional levels (0.20 or more), and found that the change-in-estimate strategy performed adequately when the cut point was set to 10 percent. However, their data, generated from a poisson model, and their analysis model, with only a single covariate in addition to the key exposure variable, are very different than the models anticipated for the current purpose.

Budtz-Jorgensen et al. (2001) compared several covariate selection strategies including backwards elimination and change-in-estimate. They looked at the backwards elimination strategy with three p-value cut-off levels, 0.05, 0.10, and 0.20, and, following the recommendation of Maldonado and Greenland (1993) used a 10% criterion for the change-in-estimate method. They found that, although the change-in-estimate strategy did an adequate job of identifying confounders and keeping them in the model, it sometimes threw out variables that were correlated with the outcome, but were not confounders. Therefore, this method threw out variables that, if retained, would have reduced the residual error and reduced the standard error of the exposure coefficient (thus increasing the power to detect exposure effects – exposure effect is analogous to the key predictor of interest). Although they found that backwards elimination with a $p<0.05$ criterion was un-suited for confounder identification, they found that when the p-value criterion was set to $p<0.20$, backwards elimination strategy resulted in a reduction of residual error variance and did not throw out important confounders. They recommended the backwards elimination strategy with a $p<0.20$ criterion over the change-in-estimate strategy.

Maldonado, G., Greenland, S. 1993. Simulation study of confounder-selection strategies. *American Journal of Epidemiology* 138(11), 923-936

Budtz-Jorgensen, E., Keilding, N., Grandjean, P., Weihe, P.,and White, R. 2001. *Confounder identification in environmental epidemiology. Assessment of health effects of prenatal mercury exposure*. Downloaded from http://www.pubhealth.ku.dk/bsa/research-reports/paper_ms.ps

model indicated that the probability of being a responding applicant was related to: applicant's proposal score (final score), award status, award cohort (cohort), under-represented minority status (URM), and disability status. The results from the final model are summarized in Exhibit B.5.

Exhibit B.5: Summary of Final Model Results

Type III Analysis of Effects			
Variable	DF	Wald Chi-Square	Pr > Chisq
Final Score	1	1.5846	0.2081
Score Imputation	1	0.0006	0.9812
Award Status	1	12.5015	0.0004**
Cohort	1	1.6889	0.1938
URM	2	12.0256	0.0024**
Disability status	2	8.0309	0.0180*
Award Status*Cohort	1	3.7972	0.0513
Final Score*Cohort	1	4.2091	0.0402*
Cohort*URM	2	3.4074	0.1820
Cohort*Disability Status	2	3.7234	0.1554

The Logistic Procedure Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Final Score	1	-0.3990	0.3169	1.5846	0.2081
Final Score Imputation	1	-10.7278	454.9	0.0006	0.9812
Award Status	1	2.1879	0.6188	12.5015	0.0004**
Cohort Status	1	-0.9899	0.7618	1.6889	0.1938
Non-URM	1	2.8744	0.8342	11.8715	0.0006**
URM	1	2.6899	0.9522	7.9806	0.0047**
Not Disabled	1	1.9765	0.7009	7.9521	0.0048**
Disabled	1	2.3449	2.4223	0.9371	0.3330
Award*Cohort	1	-0.6775	0.3477	3.7972	0.0513
Final Score*Cohort	1	0.3777	0.1841	4.2091	0.0402*
Cohort*Non-URM	1	-0.9657	0.5253	3.3790	0.0660
Cohort*URM	1	-0.7897	0.5967	1.7518	0.1856
Cohort*Not Disabled	1	0.8437	0.4708	3.2115	0.0731
Cohort*Disabled	1	-0.1734	1.3712	0.0160	0.8994

*p<.05, ** p <0.01 , *** p<.001

Step 2: Use Model Results to Calculate Response Propensities

In Step 2, parameter estimates obtained from the fitted model were used to calculate the predicted probability that an applicant will respond to the survey. The logistic regression model is represented as:

$$\log\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \sum_k \beta_{ki},$$

where π_i is the probability that applicant i is a responding applicant, and the summation is over the k predictor variables in the final model. The predicted probabilities were obtained by solving the

previous equation for π_i, and substituting the parameter estimates from the fitted model in place of the parameters. The solution for the predicted probability for applicant i is given by:

$$\hat{\pi}_i = \frac{\exp(\hat{\beta}_0 + \sum_k \hat{\beta}_{ki})}{1 + \exp(\hat{\beta}_0 + \sum_k \hat{\beta}_{ki})}$$

Each applicant's predicted probability of response ($\hat{\pi}_i$) is called its "response propensity". Applicants with similar response propensities have similar characteristics. In particular, they are similar on the characteristics that are most related to the probability of response.

Step 3: Group Applicants with Similar Response Propensities into Weighting Classes

In this step, applicants with similar response propensities were grouped into weighting classes. The weights of responding applicants within a class were inflated so that the responding applicants within the class represent the population that both the responding and non-responding applicants within the class were originally sampled to represent. Exhibit B.6 shows the distribution of response propensities for the applicant sample.

Exhibit B.6: Distributions of Propensity Scores (All Applicants)

Quantile	Estimate
100% Max	0.90707
99%	0.89197
95%	0.88639
90%	0.88488
75% Q3	0.88204
50% Median	0.76279
25% Q1	0.55201
10%	0.054562
5%	0.015541
1%	0.013647
0% Min	0.000001611

Weighting classes were formed to ensure that all applicants within a class fell within a narrow range of propensity scores. The boundaries for the weighting classes were determined by creating approximately equal-interval propensity score groupings. The top and the bottom of each propensity interval differed by .024 to ~.35 points. The resulting five classes corresponded to propensities in the ranges of ~0-35, 35–68, 68–84, 84–88, and 88–91 percent probability of response. Exhibit B.7 shows the frequency and percent of applicants that fell within each of the five weighting classes.

Exhibit B.7: Number and Percent of Applicants in Each of Five Weighting Classes (Results for All Applicants in the Sample)

Weighting Class	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1)Propensities ~0-.35	468	22.57	468	22.57
2)Propensities .35-.68	417	20.11	885	42.67
3)Propensities .68-.84	301	14.51	1186	57.18
4)Propensities .84-.88	464	22.37	1650	79.56
5)Propensities .88-.91	424	20.44	2074	100.00

Step 4. Within Weighting Class, Inflate Weights of Responding Applicants to Sum to Population Total

Within each weighting class, the weights of all applicants (both responders and non-responders) were summed. Next, the weights of just the responding applicants were summed. Then, within each weighting class, new, adjusted weights of responding applicants were calculated by multiplying the initial weights of 1 by a factor equal to the ratio of the sum of the weights of all applicants to the sum of the weights of the responding applicants. The adjusted weight for the i^{th} applicants in the j^{th} weighting class is represented symbolically by:

$$w_{ij}^{adj} = w_{ij} * \frac{\sum_{k \in responders\ \&\ nonresponders} w_{kj}}{\sum_{i \in responders} w_{ij}}$$

where w_{ij} is the initial sampling weight for the i^{th} applicants in the j^{th} weighting class, the summation in the numerator is over all k applicants in the set of responders and non-responders within weighting class j, the summation in the denominator is over all i applicants in the set of responders in weighting class j, and there are j = 1,…, 5 weighting classes. The new, adjusted sampling weights sum to the population total number of applicants. This result can be written symbolically as:

$$\sum_{j} \sum_{i \in responders} w_{ij}^{adj} = \sum_{j} \sum_{k \in responders\ \&\ nonresponders} w_{kj}$$

Exhibit B.8 shows that the weights of the 2,074 applicants in the sample sum to the total number of applicants in the target population (N=2,074). Exhibit B.9 shows the weights summed within each of the five weighting classes. The sum shown for the j^{th} weighting class (j = 1,…,5) corresponds to the term:

$$\sum_{k \in responders\ \&\ nonresponders} w_{kj}$$

For example, the applicant weights of the 468 applicants in the first weighting class sum to:

$$\sum_{k \in responders\ \&\ nonresponders} w_{k1} = 468.$$

Exhibit B.8: Size of Target Population (Sum of Initial Weights for All Applicants in the Sample)

Weight Variable	N	Sum	Minimum	Maximum
Appl_wgt	2,074	2,074	1.00	1.00

NOTE: Appl_wgt = the initial weight for all applicants in the sample (sums to the population total number of applicants)

Exhibit B.9: Size of Target Population Within Each Weighting Class (Sum of Weights for All Applicants in the Sample)

Weighting Class		N	Sum	Minimum	Maximum
1)Propensities	~.0-.35	468	468	1.00	1.00
2)Propensities	.35-.68	417	417	1.00	1.00
3)Propensities	.68-.84	301	301	1.00	1.00
4)Propensities	.84-.88	464	464	1.00	1.00
5)Propensities	.88-.91	424	424	1.00	1.00

NOTE: Appl_wgt = initial weight for the applicant sample (sums to population total number of applicants within class)

The sum of the initial weights of the 1,303 responding applicants is shown in Exhibit B.10. These are the "initial weights" because they are the sampling weights prior to adjustment for non-response. The weights of the 1,303 responding applicants sum to a number that is smaller than the size of the target population. Exhibit B.11 shows the weights summed within each of the five weighting classes. The sum shown for the j^{th} weighting class (j = 1,…,5) corresponds to the term:

$$\sum_{i \in responders} w_{ij} \ .$$

For example, the initial applicant weights of the n responding applicants in the first weighting class sum to:

$$\sum_{i \in responders} w_{i1} = 37$$

Exhibit B.10: Initial (Unadjusted) Weights of Responding Applicants (Sum of Initial Weights for All 1,303 Responding Applicants)

Variable	N	Sum	Minimum	Maximum
Appl_wgt	1,303	1,303	1.00	1.00

NOTE: Appl_wgt = the initial weight for the applicant sample

Exhibit B.11: Initial (Unadjusted) Weights of Responding Applicants by Weighting Class (Sum of Initial Weights for All Responding Applicants)

Weighting Class		N	Sum	Minimum	Maximum
1)Propensities	~.0-.35	37	37	1.00	1.00
2)Propensities	.35-.68	257	257	1.00	1.00
3)Propensities	.68-.84	228	228	1.00	1.00
4)Propensities	.84-.88	403	403	1.00	1.00
5)Propensities	.88-.91	378	378	1.00	1.00

NOTE: Appl_wgt = initial weight for the applicant sample (sums to population total number of applicants within class)

The inflation factors for each of the five weighting classes are shown in Exhibit B.12. The inflation factors correspond to the term:

$$\frac{\sum_{k \in responders\ \&\ nonresponders} w_{kj}}{\sum_{i \in responders} w_{ij}}.$$

For example, the inflation factor for the first weighting class is:

$$\frac{468}{37} = 12.6486$$

Exhibit B.12: Inflation Factors Within Weighting Classes

Weighting Class	All Applicants
1)Propensities ~0-.35	12.6486
2)Propensities .35-.68	1.6226
3)Propensities .68-.84	1.3202
4)Propensities .84-.88	1.1514
5)Propensities .88-.91	1.1217

Exhibits B.13 and B.14 show the sums of the non-response adjusted weights for the 1,303 responding applicants, overall and by weighting class. The adjusted weights sum to the size of the target population. The numbers shown in Exhibits A.13 and A.14 correspond to the term:

$$\sum_{j} \sum_{i \in responders} w_{ij}^{adj}$$

For example, the non-response adjusted applicant weights of the 1,303 responder applicants sum to

$$\sum_{j} \sum_{i \in responders} w_{ij}^{adj} = 2074,$$

and, for example, the non-response adjusted applicant weights of the 378 responding applicants in the bottom weighting class sum to

$$\sum_{i \in responders} w_{i1}^{adj} = 424.$$

Exhibit B.13: Sum of Nonresponse Adjusted Weights for 1039 Responding Applicants

Variable	N	Sum	Minimum	Maximum
appl_wgt_adj	1303	2074	1.1216931	12.6486486

NOTE: appl_wgt_adj = the adjusted weight for the applicant sample

Exhibit B.14: Sum of Nonresponse Adjusted Weights for 1039 Responding Applicants by Weighting Class

Weighting Class		N	Sum	Minimum	Maximum
1)Propensities	~.0-.35	37	468	12.6486	12.6486
2)Propensities	.35-.68	257	417	1.6226	1.6226
3)Propensities	.68-.84	228	301	1.3202	1.3202
4)Propensities	.84-.88	403	464	1.1514	1.1514
5)Propensities	.88-.91	378	424	1.1217	1.1217

NOTE: Appl_wft_adj = the adjusted weight for the applicant sample

Item Non-Response

Item non-response refers to one or more specific uncompleted items on an otherwise completed/returned questionnaire. Since the amount of missing data on an individual item was modest (<5% across all returned surveys), descriptive statistics were calculated on only the non-missing items, which is equivalent to an assumption that missing data on an item are missing completely at random. The amount of missing data for each item is presented in all tables/figures included in reports.

Where necessary for the impact analyses, distinct approaches to imputing values were taken depending on whether data were missing for an item used to construct a covariate or predictor variable, or an outcome variable. For impact analyses where missing data on covariate or predictor variables require imputation to prevent having to omit those respondents from the analysis, a "dummy-variable" method was used. This method entailed (i) creating a dummy variable that equals "1" if the value of the variable is missing and "0" otherwise, (ii) adding the dummy variable to the impact model as a covariate, and (iii) replacing the missing value of the original variable with predicted values from a logistic or linear regression model (see appendix C for more details).

If the missing data occurred in an item used to construct an outcome—that is, one of the primary outcomes of interest (for example, the post-fellowship number of publications produced with a foreign co-author)—no imputation was conducted.

Appendix C: Detailed Description of Impact Analysis

This appendix describes the methodology used to estimate the effects of the EAPSI award on its recipients. First, key features of the quasi-experimental design are reviewed in order to provide context for a general discussion of the use of propensity score analysis (PSA) in mitigating selection bias. Next, the steps used to match awardees and non-awardees are presented in detail, including the estimated logistic model and the resulting distribution of awardees and non-awardees in the propensity strata. Finally, specifications of the impact models and sensitivity analyses conducted are presented.

Propensity Score Matching

One of the main purposes of this evaluation was to estimate the effect of EAPSI on its participants. If a program brings about changes in its participants, then these individuals should have different outcomes, post-participation, than they would have had in the absence of program participation.

Questions about the impact of a program seek to determine whether any observed differences between participants and non-participants can be attributed to the program itself rather than to other, non-program related causes. One potential source of other causes for differences between the two groups is pre-existing characteristics that could affect both selection into the program and post-program differences, often called "selection bias". Propensity score matching (PSM) was used to mitigate selection bias for this evaluation.

Propensity score matching is one type of propensity score analysis (PSA) wherein participants in a program are matched to non-participants on the basis of their "participation propensity score." This technique uses pre-treatment characteristics to determine the probability (i.e., the propensity score) that applicants would be selected for the treatment (namely, an EAPSI award) based on known pre-existing characteristics). After assigning a propensity score to each individual, applicants are placed into blocks (or matching strata) such that the actual EAPSI awardees and the unfunded applicants within each block have approximately equal predicted propensity to be in the treated group. The quasi-experimental estimates of the impact of the program can then be obtained by comparing the outcomes of awardees and non-awardees within each propensity block and aggregating the differences across the blocks. This is accomplished by including terms for the propensity blocks in the models used for analysis.

PSM was performed via the following four steps:

Step 1: Identify the pre-treatment characteristics that will be used in the propensity score model to match fellows and unfunded applicants.

The pre-treatment characteristics to be used in the propensity score model to match fellows and unfunded applicants were identified. These characteristics included variables that both predicted receiving the fellowship and that might also affect the outcomes of interest. They were taken from NSF extant data and applicant survey data. Exhibit C.1 shows the variables used in the propensity score model.

Some of the characteristics to be used in the PSA had missing data. If these missing data had been ignored, records that had missing data in the PSA matching would have been lost. A recommended approach for addressing this issue is to do a simple single imputation of the missing covariates and include missing data indicators in the propensity score model. This method essentially matches both on the observed values and on the missing data patterns (Stuart 2010).[4] Although it cannot balance the missing data values themselves this method will yield balance on the covariates and the missing data patterns (Rosenbaum and Rubin, 1984).[5]

Single imputation substitutes a missing value with a definite value following an established procedure. Predicted values from a logistic or linear regression model were used to impute a definite value for missing values in this study. The outcomes for these models were the PSA variables that had missing data and the predictors were all PSA variables with non-missing data. Imputation was done first for the variable with the least amount of missing. This variable was then added to the right hand side of the model for the next variable with the least amount of missing. This process continued through to the variable with the most number of cases missing with all of the other PSA variables. For binary variables a imputation was done using randomly generated a 0 or 1 using a binomial distribution with p=predicted probability from the model discussed above. For continuous variable the predicted values generated from the model was used as the imputed value. Imputation flags were created to indicate if an observation was imputed or not to include in the PSA model. Exhibit C.2 shows the distribution of each variable overall and by award status prior and post-imputation.

[4] Stuart, E.A. 2010. Matching methods for casual inference: A review and a look forward. *Statistical Science, 25* (1), 1-21.

[5] Rosenbaum, P.R. and Rubin, D.B. 1984. Reducing bias in observational studies using subclassification on the propensity score. *Journal of the American Statistical Association* 79, 516 -524.

Exhibit C.1: Pre-Award Data Used to Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Reason for Inclusion in Propensity Score Model[1]	Data Source(s)	Type	Definition
Mean proposal score	Proposal score indicates quality of application	NSF Extant Data	Continuous	Average score across reviews (1-5)
Cohort year	Control for cohort differences	NSF Extant Data	Dichotomous	2002 (0/1) 2003 (0/1) 2004 (0/1) 2005 (0/1) 2006 (0/1) 2007 (0/1) 2008 (0/1) 2009 (0/1)
Gender	Preference given for females (women encouraged to apply)[a]	EAPSI Applicant Survey: G1, NSF Extant Data	Dichotomous	1=Female 0=Male
Under-represented minority status	Preference given for under-represented minority status (members of these groups were encouraged to apply) [a]	EAPSI Applicant Survey: G2, G3, NSF Extant Data	Dichotomous	1=Other race(s)/ethnicity 0=Asian Only or White Only
Citizenship status	US citizenship (birth, naturalized) or permanent residency required [a]	EAPSI Applicant Survey: G4, G4a	Dichotomous	1=US Citizen/Permanent Resident 0=Non-US Citizen or Permanent Resident
Disability status	Preference given to disabled applicant (disabled applicants encouraged to apply) [a]	EAPSI Applicant Survey: G5, NSF Extant Data	Dichotomous	1=Disabled 0=Not-Disabled

Exhibit C.1: Pre-Award Data Used to Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Reason for Inclusion in Propensity Score Model[1]	Data Source(s)	Type	Definition
STEM discipline	Desire for disciplinary balance in program portfolio [a]	EAPSI Applicant Survey: A7	Dichotomous	Biological, agricultural, or environmental life sciences (1/0) Physical and related sciences (includes Chemistry except biochem; earth, atmospheric, ocean sciences; physics) (1/0) Computer and information sciences & Mathematics and statistics (1/0) Psychology & social sciences &related science (1/0) Engineering (1/0) Health (non-STEM) 1/0)
Undergraduate GPA	EAPSI application requests undergraduate transcript[a]	EAPSI Applicant Survey: C1	Continuous	1=Less than 1.25 (Mostly D's or below) 2=1.25 – 1.74 GPA (About half C's/half D's) 3=1.75 – 2.24 GPA (Mostly C's) 4=2.25 – 2.74 GPA (About half B's/half C's) 5=2.75 – 3.24 GPA (Mostly B's) 6=3.25 – 3.74 GPA (About half A's/half B's) 7=3.75 – 4.00 GPA (Mostly A's)
Graduate degree program	Master's- or Doctoral-level (M.D. included) program[a]	EAPSI Applicant Survey: A5	Dichotomous	1=Doctorate 0=Master's
Study-abroad as an undergraduate or graduate	Prior international experience favorable for EAPSI applicant[a]	EAPSI Applicant Survey:C2a, C2b	Dichotomous	1=Prior experience studying abroad 0=No Prior experience studying abroad

Exhibit C.1: Pre-Award Data Used to Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Reason for Inclusion in Propensity Score Model[1]	Data Source(s)	Type	Definition
Prior visit to host location	Prior exposure to host location favorable for applicant (shows evidence of "willingness to live in and adapt to foreign cultures") a	EAPSI Applicant Survey:C3, C6	Continuous	0=Did not live or study abroad 1=Lived in a foreign country but not the country applied OR Lived in a foreign country for 6 months or longer OR Attended school in another country outside the US 2= Lived in country applied to
Prior relevant language(s)	Language aptitude or achievement not required but likely favorable for applicant[a]	EAPSI Applicant Survey:C4	Dichotomous	1= Prior relevant language(s) 0=No prior relevant language(s)
Participation in international club(s)	Favorable for EAPSI applicant[a]	EAPSI Applicant Survey:C5	Dichotomous	1= Participated in international club(s) 0=Did not participate in international club(s)
Prior international collaboration	Beneficial to applicant[a]	EAPSI Applicant Survey: C6, C7b	Dichotomous	1=Prior international collaboration 0= No prior international collaboration
Letter of support from host	Strongly favorable for EAPSI applicant[a]	EAPSI Applicant Survey:C7a	Dichotomous	1=Yes letter of support from host 0=No letter of support from host/I do not recall
Prior international exposure	Prior exposure to foreign colleagues or former program fellow favorable to applicant	EAPSI Applicant Survey:C6	Dichotomous	1=Prior exposure to foreign colleagues or former program fellow 0=No prior exposure to foreign colleagues or former program fellow
Link between US, host institutions	Likely to be beneficial to applicant	EAPSI Applicant Survey:C7c	Dichotomous	1=Link between US, host institutions 0=No Link between US, host institutions
Total pre-award publications	Prior record of achievement favorable[a]	EAPSI Applicant Survey:C8	Continuous	Total pre-award publication

Exhibit C.1: Pre-Award Data Used to Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Reason for Inclusion in Propensity Score Model[1]	Data Source(s)	Type	Definition
% publications w/foreign collaborator	Likely to be beneficial to applicant	EAPSI Applicant Survey:C8	Continuous	Percent of publications with foreign collaborator
National post-collegiate fellowship	Prior record of achievement favorable[a]	EAPSI Applicant Survey:C9	Dichotomous	1=Received a national post-collegiate fellowship 0=Did not received any national post-collegiate fellowship

[a] These prerequisites are taken from NSF solicitations 99-152, 02-007, 02-174, 03-608, 05-617, 06-602, 07-584, 08-603, and 10-591.

Exhibit C.2: Distribution of Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Variable	Prior to Imputation					Post-Imputation				
		N	N miss	Min	Max	Mean/ Percent	N	N miss	Min	Max	Mean/ Percent
Among All Applicants											
Mean Proposal Score	finalscore	1303	0	1	5	3.86	1303	0	1	5	3.86
Cohort Year	dum2000	1303	0	0	1	4.7%	1303	0	0	1	4.7%
	dum2001	1303	0	0	1	3.4%	1303	0	0	1	3.4%
	dum2002	1303	0	0	1	6.8%	1303	0	0	1	6.8%
	dum2003	1303	0	0	1	4.7%	1303	0	0	1	4.7%
	dum2004	1303	0	0	1	8.7%	1303	0	0	1	8.7%
	dum2005	1303	0	0	1	10.4%	1303	0	0	1	10.4%
	dum2006	1303	0	0	1	10.1%	1303	0	0	1	10.1%
	dum2007	1303	0	0	1	12.3%	1303	0	0	1	12.3%
	dum2008	1303	0	0	1	22.9%	1303	0	0	1	22.9%
Gender	cr_nrbias_gender	1303	0	0	1	43.7%	1303	0	0	1	43.7%
Under-Represented Minority Status	cr_nrbias_URM	1272	31	0	1	12.7%	1303	0	0	1	13.0%
Citizenship Status	desc_ctzn	1269	34	0	1	97.9%	1303	0	0	1	97.9%
Disability status	cr_nrbias_hdcap	1269	34	0	1	0.6%	1303	0	0	1	0.8%
STEM Discipline	dumSTEMBiology	1303	0	0	1	29.0%	1303	0	0	1	29.0%
	dumSTEMComputer	1303	0	0	1	8.6%	1303	0	0	1	8.6%
	dumSTEMEngineer	1303	0	0	1	21.6%	1303	0	0	1	21.6%
	dumSTEMHealth	1303	0	0	1	9.3%	1303	0	0	1	9.3%
	dumSTEMPhysical	1303	0	0	1	27.5%	1303	0	0	1	27.5%
	dumSTEMSocial	1303	0	0	1	4.1%	1303	0	0	1	4.1%
Undergraduate GPA	UGGPA	1289	14	2	7	6.24	1303	0	2	7	6.23
Graduate Degree Program	PhDYes	1301	2	0	1	78.2%	1303	0	0	1	78.2%
Study Abroad as an undergraduate or graduate	StudAbr	1294	9	0	1	37.9%	1303	0	0	1	37.8%

Exhibit C.2: Distribution of Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Variable	Prior to Imputation					Post-Imputation				
		N	N miss	Min	Max	Mean/ Percent	N	N miss	Min	Max	Mean/ Percent
Prior visit to host location	PriorSiteVis	1300	3	0	2	0.65	1303	0	0	2	0.65
Prior relevant language	PriorLang	1301	2	0	1	23.6%	1303	0	0	1	23.6%
Participation in international clubs	IntlClub	1295	8	0	1	42.1%	1303	0	0	1	42.0%
Prior international collaboration	PriorCollab	1292	11	0	1	37.7%	1303	0	0	1	37.7%
Letter of support from host	LetterSupp	1296	7	0	1	70.3%	1303	0	0	1	70.3%
Prior international exposure	IntlExpose	1300	3	0	1	31.9%	1303	0	0	1	31.8%
Link between host, US institution	LinkHost	1299	4	0	1	36.4%	1303	0	0	1	36.3%
Total Pre-Award publications	AllWorks	1130	184	0	75	4.04	1303	0	0	75	3.91
Percent of publications with a foreign collaborator	PercentWorks	1115	188	0	100	9.02	1303	0	0	100	9.00
National post-collegiate fellowship	fellowship	1286	17	0	1	22.0%	1303	0	0	1	22.1%
Among Awardees Only											
Mean Proposal Score	finalscore	938	0	1.3	5	4.14	938	0	1.3	5	4.14
Cohort Year	dum2000	938	0	0	1	6.5%	938	0	0	1	6.5%
	dum2001	938	0	0	1	4.7%	938	0	0	1	4.7%
	dum2002	938	0	0	1	7.4%	938	0	0	1	7.4%
	dum2003	938	0	0	1	6.2%	938	0	0	1	6.2%
	dum2004	938	0	0	1	8.6%	938	0	0	1	8.6%

Exhibit C.2: Distribution of Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Variable	Prior to Imputation					Post-Imputation				
		N	N miss	Min	Max	Mean/ Percent	N	N miss	Min	Max	Mean/ Percent
	dum2005	938	0	0	1	11.3%	938	0	0	1	11.3%
	dum2006	938	0	0	1	10.8%	938	0	0	1	10.8%
	dum2007	938	0	0	1	12.0%	938	0	0	1	12.0%
	dum2008	938	0	0	1	15.8%	938	0	0	1	15.8%
	dum2009	938	0	0	1	16.7%	938	0	0	1	16.7%
Gender	cr_nrbias_gender	938	0	0	1	42.0%	938	0	0	1	42.0%
Under-Represented Minority Status	cr_nrbias_URM	919	19	0	1	11.5%	938	0	0	1	12.0%
Citizenship Status	desc_ctzn	915	23	0	1	98.4%	938	0	0	1	98.3%
Disability status	cr_nrbias_hdcap	912	26	0	1	0.7%	938	0	0	1	0.9%
STEM Discipline	dumSTEMBiology	938	0	0	1	28.3%	938	0	0	1	28.3%
	dumSTEMComputer	938	0	0	1	8.7%	938	0	0	1	8.7%
	dumSTEMEngineer	938	0	0	1	21.4%	938	0	0	1	21.4%
	dumSTEMHealth	938	0	0	1	8.8%	938	0	0	1	8.8%
	dumSTEMPhysical	938	0	0	1	28.7%	938	0	0	1	28.7%
	dumSTEMSocial	938	0	0	1	4.1%	938	0	0	1	4.1%
Undergraduate GPA	UGGPA	928	10	3	7	6.27	938	0	3	7	6.27
Graduate Degree Program	PhDYes	938	0	0	1	80.9%	938	0	0	1	80.9%
Study Abroad as an undergraduate or graduate	StudAbr	935	3	0	1	37.9%	938	0	0	1	37.7%
Prior visit to host location	PriorSiteVis	937	1	0	2	0.65	938	0	0	2	0.65
Prior relevant language	PriorLang	937	1	0	1	27.3%	938	0	0	1	27.3%
Participation in international clubs	IntlClub	936	2	0	1	40.2%	938	0	0	1	40.1%
Prior international collaboration	PriorCollab	933	5	0	1	37.4%	938	0	0	1	37.3%

Exhibit C.2: Distribution of Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Variable	Prior to Imputation					Post-Imputation				
		N	N miss	Min	Max	Mean/ Percent	N	N miss	Min	Max	Mean/ Percent
Letter of support from host	LetterSupp	935	3	0	1	73.0%	938	0	0	1	73.1%
Prior international exposure	IntlExpose	937	1	0	1	33.8%	938	0	0	1	33.8%
Link between host, US institution	LinkHost	936	2	0	1	40.1%	938	0	0	1	40.0%
Total Pre-Award publications	AllWorks	815	123	0	75	4.08	938	0	0	75	3.97
Percent of publications with a foreign collaborator	PercentWorks	812	126	0	100	9.59	938	0	0	100	9.48
National post-collegiate fellowship	fellowship	929	9	0	1	23.6%	938	0	0	1	23.5%
Among Declines Only											
Mean Proposal Score	finalscore	365	0	1	5	3.13	365	0	1	5	3.13
Cohort Year	dum2000	365	0	0	0	0.0%	365	0	0	0	0.0%
	dum2001	365	0	0	0	0.0%	365	0	0	0	0.0%
	dum2002	365	0	0	1	5.5%	365	0	0	1	5.5%
	dum2003	365	0	0	1	0.8%	365	0	0	1	0.8%
	dum2004	365	0	0	1	9.0%	365	0	0	1	9.0%
	dum2005	365	0	0	1	8.2%	365	0	0	1	8.2%
	dum2006	365	0	0	1	8.2%	365	0	0	1	8.2%
	dum2007	365	0	0	1	12.9%	365	0	0	1	12.9%
	dum2008	365	0	0	1	41.4%	365	0	0	1	41.4%
	dum2009	365	0	0	1	14.0%	365	0	0	1	14.0%
Gender	cr_nrbias_gender	365	0	0	1	47.9%	365	0	0	1	47.9%
Under-Represented Minority Status	cr_nrbias_URM	353	12	0	1	15.6%	365	0	0	1	15.6%

Exhibit C.2: Distribution of Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Variable	Prior to Imputation					Post-Imputation				
		N	N miss	Min	Max	Mean/ Percent	N	N miss	Min	Max	Mean/ Percent
Citizenship Status	desc_ctzn	354	11	0	1	96.6%	365	0	0	1	96.7%
Disability status	cr_nrbias_hdcap	357	8	0	1	0.6%	365	0	0	1	0.5%
STEM Discipline	dumSTEMBiology	365	0	0	1	31.0%	365	0	0	1	31.0%
	dumSTEMComputer	365	0	0	1	8.2%	365	0	0	1	8.2%
	dumSTEMEngineer	365	0	0	1	21.9%	365	0	0	1	21.9%
	dumSTEMHealth	365	0	0	1	10.4%	365	0	0	1	10.4%
	dumSTEMPhysical	365	0	0	1	24.4%	365	0	0	1	24.4%
	dumSTEMSocial	365	0	0	1	4.1%	365	0	0	1	4.1%
Undergraduate GPA	UGGPA	361	4	2	7	6.14	365	0	2	7	6.14
Graduate Degree Program	PhDYes	363	2	0	1	71.1%	365	0	0	1	71.2%
Study Abroad as an undergraduate or graduate	StudAbr	359	6	0	1	37.9%	365	0	0	1	37.8%
Prior visit to host location	PriorSiteVis	363	2	0	2	0.64	365	0	0	2	0.64
Prior relevant language	PriorLang	364	1	0	1	14.0%	365	0	0	1	14.0%
Participation in international clubs	IntlClub	359	6	0	1	47.1%	365	0	0	1	46.8%
Prior international collaboration	PriorCollab	359	6	0	1	38.4%	365	0	0	1	38.6%
Letter of support from host	LetterSupp	361	4	0	1	63.2%	365	0	0	1	63.0%
Prior international exposure	IntlExpose	363	2	0	1	27.0%	365	0	0	1	26.8%
Link between host, US institution	LinkHost	363	2	0	1	27.0%	365	0	0	1	26.8%
Total Pre-Award publications	AllWorks	304	61	0	33	3.91	365	0	0	33	3.76

Exhibit C.2: Distribution of Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Pre-Award Characteristic	Variable	Prior to Imputation					Post-Imputation				
		N	N miss	Min	Max	Mean/ Percent	N	N miss	Min	Max	Mean/ Percent
Percent of publications with a foreign collaborator	PercentWorks	303	62	0	100	7.49	365	0	0	100	7.80
National post-collegiate fellowship	fellowship	357	8	0	1	17.9%	365	0	0	1	18.6%

Step 2: Fit a logistic model that predicts the probability of being awarded a fellowship based on pre-treatment characteristics.

The participation propensity score for each individual was estimated using a logistic model with the identified pre-treatment characteristics (see Exhibit C.3) as the independent variables and receipt of the fellowship (dummy-coded as 0 or 1) as the dependent variable. In general, variables were not excluded from the logistic model merely because of a lack of significance, i.e., variables were included regardless of whether they predicted treatment. Collinearity was accepted among the predictors because the model was not intended to predict anything outside the sample space. Exhibit C.3 displays the resulting logistic model. The coefficients from this model were used to estimate the propensity score for each individual, which represents the probability of receiving a fellowship.

Exhibit C.3: Propensity Score Logistic Model

Variable	Coefficient	Standard Error	Prob > |z|
finalscore	2.79	0.18	0.00
dum2002	0.47	0.43	0.28
dum2003	-1.17	0.77	0.13
dum2004	0.71	0.40	0.07
dum2005	0.33	0.39	0.40
dum2006	2.01	0.51	0.00
dum2007	1.28	0.32	0.00
dum2008	2.90	0.29	0.00
cr_nrbias_gender	0.22	0.20	0.29
cr_nrbias_urm	-0.34	0.27	0.22
Cr_nrbias_urm_imp_flg	-0.24	0.66	0.71
cr_nrbias_hdcap	0.16	1.10	0.89
Cr_nrbias_hdcap_imp_flg	-0.02	0.74	0.98
dumstemcomputer	-1.52	0.41	0.00
dumstemengineer	0.05	0.26	0.85
dumstemhealth	0.29	0.38	0.45
dumstemphysical	-0.59	0.30	0.05
dumstemsocial	-0.86	0.52	0.10
Uggpa	0.15	0.12	0.21
uggpa_imp_flg	-3.30	1.61	0.04
Phdyes	-0.04	0.28	0.88
Studabr	0.18	0.24	0.45
studabr_imp_flg	1.99	1.19	0.10
Priorsitevis	-0.18	0.16	0.25
Priorlang	-1.67	0.29	0.00
Intlclub	0.29	0.20	0.14
intlclub_imp_flg	2.43	2.40	0.31
priorcollab	1.33	0.43	0.00
Priorcollab_imp_flg	1.88	1.43	0.19
lettersupp	-0.11	0.22	0.61
Lettersupp_imp_flg	-1.04	4.52	0.82
intlexpose	-0.25	0.21	0.24
linkhost	-0.95	0.21	0.00
linkhost_imp_flg	-1.50	4.69	0.75
allworks	0.01	0.02	0.64
allworks_imp_flg	0.38	1.47	0.80

Exhibit C.3: Propensity Score Logistic Model

Variable	Coefficient	Standard Error	Prob > |z|
percentworks	0.01	0.02	0.47
Percentworks_imp_flg	-0.29	1.46	0.84
fellowship	0.14	0.24	0.57
Fellowship_imp_flg	0.80	1.11	0.47
phdyes_prciocollab	-0.92	0.45	0.04
studabr_stemphys	0.25	0.46	0.58
dum2006_priorcollab	-1.37	0.63	0.03
percentworkssquare	0.00	0.00	0.83
gender_dum2006	-1.00	0.63	0.11
_cons	-11.34	6.00	0.06

Number of observations =1303 Pseudo R^2 = 0.4860
LR chi^2 (42) = 751.12 Log-likelihood = -397.20877
Prob > chi^2 = 0.0000

NOTES: In estimating the propensity score through a probability model, the choice of which interaction term to include is determined solely by the need to condition fully on the observable characteristics that make up the assignment mechanism. When covariates are not balanced within a particular stratum, the solution adopted is to divide the stratum into finer strata and test again for no difference in the distribution of covariates within the finer strata. If however, some covariates still remain unbalanced, the score may be poorly estimated which suggests that additional terms (interaction or higher-order terms) of the unbalanced covariates should be added to the logistic specification to control better for these characteristics. This procedure is repeated until the covariates are balanced. See Deheija & Wahba (2002). Propensity score-matching methods for non-experimental casual studies. *The Review of Economics and Statistics, 84*(1): pg 161.[6]

Step 3: Use the estimated propensity scores to create matched sets of fellows and unfunded applicants.

The estimated propensity scores were used to create matched sets of fellows and unfunded applicants. Propensity scores can be utilized in a number of ways, including matching, stratification, weighting, and regression adjustment.[7] Stratification (also called interval matching) was initially identified as the primary method of matching; after the sensitivity checks were conducted the 3:1 matching method (see the sensitivity section below for discussion) was selected as the primary method for matching. Once the propensity scores were assigned, the region of common support was defined as [.02034455, .99989093]. Individuals were identified and excluded from the analyses if they were outside of the "common support" group – the range of common scores across fellows and unfunded applicants. Enforcing the common support is important to ensure the similarity of the matched non-awardees to awardees.[8] 0 awardees and 38 non-awardees were dropped because their propensity score was outside of this range.

6 See Deheija and Wahba. 2002. Propensity score-matching methods for non-experimental casual studies. *The Review of Economics and Statistics, 84*(1), 161.

7 Keisuke, H., Imbens, G.W., and Ridder, G. 2003. Efficient estimation of average treatment effects Using the estimated propensity score. *Econometrica*, 71(4), 1161-89; Morgan, S.L. and Harding, D. J. 2006. Matching estimators of causal effects: prospects and pitfalls in theory and practice. *Sociological Methods and Research*, 35(1), 3–60; and Abadie, A., and Imbens, G. W. 2009. *Matching on the Estimated Propensity Score*. NBER Working Paper.

8 Rosenbaum and Rubin, 1984; Caliendo, M. and Kopeinig, S. 2007. Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22(1), 31-72.

The remaining individuals were divided into strata within which the awardee and non-awardee groups had statistically the same[9] mean propensity score. Within each of these strata tests were conducted to identify significant differences between the treatment and comparison group on the independent variables. The model was adjusted until all such differences were removed[10].

The treatment and comparison groups were divided into 6 strata based on their propensity scores. Research has indicated that at least five strata are generally sufficient for removing 90 percent or more of the bias due to the covariates.[11] Exhibit C.4 shows the distribution of the treatment and comparison group members by propensity score strata. Exhibit C.5 shows a histogram of propensity scores for the treatment and comparison groups.

Exhibit C.4: Number of Awardee and Non-Awardee in each Propensity Score Block

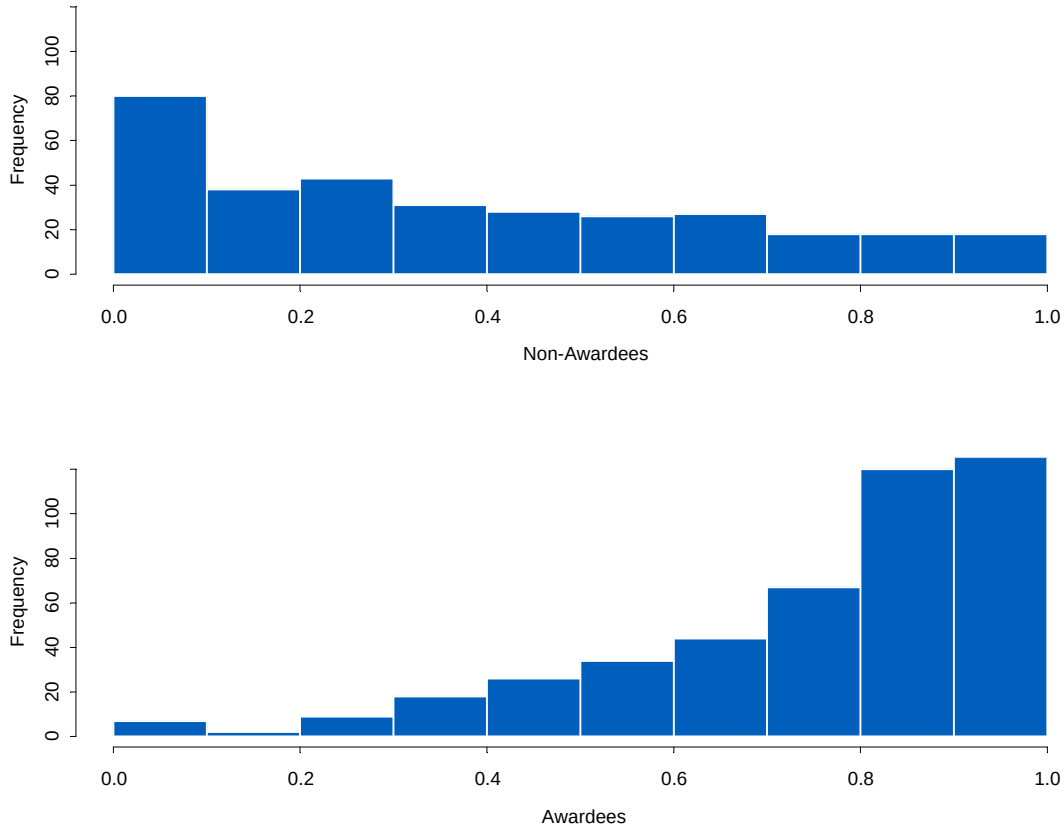
Inferior of Block of Pscore	Non-Awardee	Awardee	Total
.0203445	118	9	127
.2	74	27	101
.4	54	60	114
.6	45	111	156
.8	18	120	138
.9	18	611	629
Total	327	938	1265
Number outside the region of common support	38	0	38

[9] Based on level p<0.01 t-tests.

[10] The Intercooled STATA10 pscore process was used to obtain propensity score balance.

[11] Rosenbaum and Rubin, 1984.

Exhibit C.5: Histograms of Propensity Scores



Step 4: Test whether there are any differences between the awardees and non-awardees within each propensity score strata.

This analysis was conducted in two ways. First, t-tests were used to determine if there were any difference for awardees and non-awardees within each stratum for each pre-treatment characteristic.[12] As this test is sensitive to sample size (*i.e.*, they tend fail to detect sizable differences in small samples, but detect slight differences in larger samples), this analysis was supplemented using standardized differences.[13] The standardized difference of a matching characteristic between awardees and non-awardees in a given propensity score stratum is calculated using the following formula:

[12] Dehejia and Wahba, 2002; Agodini, R., and Dynarski, M. 2004. Are experiments the only option? A look at dropout prevention programs. *Review of Economics and Statistics*, 86(1), 180-94.

[13] Morgan, S.L., and Winship, C. 2008. *Counterfactuals and causal inference: Methods and principles for social Research.* New York: Cambridge University Press.

$$B_{X,S} = \frac{|\bar{X}_{T,S} - \bar{X}_{C,S}|}{\sqrt{\frac{1}{2}\sigma^2{}_{X,T} + \frac{1}{2}\sigma^2{}_{X,C}}}$$

Where:

X denotes the variable of interest;

S denotes the stratum;

T denotes the treatment group, and C denotes the comparison group;

$\bar{X}_{T,S}$ and $\bar{X}_{C,S}$ denote the treatment and comparison group mean of X in stratum S; and

$\sigma^2{}_{X,T}$ and $\sigma^2{}_{X,C}$ denote the overall variance of X in the treatment and comparison group, respectively.

For regression adjustments to be trustworthy standardized differences of means should be less that 0.25 (Rubin, 2001)[14] and you want very few of significant t-tests (Stuart 2010).[15] Checks were conducted for statistical balance and modified the models in step 2 by including interactions and higher-order terms of the unbalanced characteristics until satisfactory statistical balance was achieved i.e. models were improved until it was no longer possible to reduce the number of significant t-tests or standardized differences <0.25. For this study total of five models that achieved propensity score balance to achieve this result were fit.

Pre-treatment characteristics and standardized differences between awardees and non-awardees within each of the 6 strata were examined. The sizes of the treatment-control differences expressed in standard deviation units (standardized differences) ranged from .010 to .910, with the largest differences in the block with the smallest awardee group size (block 1). Controls were included the impact model for any characteristics in the impact models whose standardized differences were greater than 0.25.

Impact Models

Following the propensity score matching, the impact of the EAPSI program was estimated by comparing fellows' outcomes to those of their comparison group to determine what fellows' expected outcomes would have been had they not received an EAPSI award.

Estimation of Impacts

After creating the propensity score strata, a multivariable regression model was used to estimate the impact of the program of interest. This regression model employed a number of matching

[14] Rubin, D.B. 2001. Using propensity scores to help design observational studies: Application to the tobacco litigation. *Health Services and Outcomes Research Methodology* 2, 169-188.

[15] Stuart, 2010.

characteristics and other variables (see Exhibit C.6) that are hypothesized to affect the outcomes of interest such as covariates. The inclusion of the matching characteristics in this model give us the chance to get a "doubly-robust" impact estimate since they would have been used twice: both in the propensity score model and in the estimation of impacts.[16] The following regression model was used to estimate the program impact:[17]

Impact Model

$$[1]\quad Y_i = \beta_0 + \beta_1 T_i + \sum_{j=1}^{b-1} \beta_{j+1} S_i^j + \sum_{j=1}^{b-1} \beta_{j+b} T_i S_i^j + \sum_{n=1}^{N} \beta_{n+(b+3)} X_i^n + \varepsilon_i$$

Where:

Y_i is the outcome of interest for individual i,

T_i is the treatment indicator for individual i (1=awardee , 0=non-awardee),

S_i^j is the indicator (dummy) variable for the j^{th} propensity score stratum. The prototypical model includes the total number of strata (*b*) minus one strata indicators (j=1,2 ,…, b-1). The last stratum is the reference stratum and a dummy for this stratum is not included in the model,

X_i^n is the n^{th} (n=1,2,…,N) covariate for individual i (such as gender, URM, etc.) that are grand-mean centered, and

ε_i is the usual error term for individual Interpretation of Parameters

Interpretation of the coefficients in the model is as follows:

$\hat{\beta}_0$ is the covariate-adjusted mean value of the outcome for the non-awardees in the reference propensity score stratum,

$\hat{\beta}_0 + \hat{\beta}_{j+1}$ (j=1,2,…,b-1) is the covariate-adjusted mean value of the outcome for the non-awardees in the j^{th} stratum,

$\hat{\beta}_1$ is the impact estimate for the reference stratum (i.e. the difference between the mean value of the outcome of the awardees and non-awardees in the reference stratum),

$\hat{\beta}_{j+b}$ (j=1,2,…,b-1) is the difference between the impact estimate for the j^{th} stratum and the impact estimate for the reference stratum,

[16] Ho D.E., Imai K., King G., and Stuart E. A. 2007. Matching as nonparametric preprocessing for reducing model dependence in parametric causal inference. *Political Analysis*, 15, 199–236.; Morgan and Harding, 2006.

[17] For illustrative purposes, the impact model is presented for continuous outcomes. For binary outcomes, a logistic model was fit structured similarly to the model in Equation 1.

$\hat{\beta}_1 + \hat{\beta}_{j+b}$ (j=1,2,…,b-1) is the impact estimate (i.e., the covariate adjusted difference between the outcomes of the awardees and non-awardees) for the j^{th} stratum, and

$\hat{\beta}_{n+(b+3)}$ (n=1,2,…,N) is the estimated overall relationship between the n^{th} covariate and the outcome controlling for other covariates.

Treatment Effects

Overall treatment effect (estimated impact)

As seen, the model in Equation 1 allows for the estimation of separate treatment effect estimates for each propensity score stratum. More specifically, $\hat{\beta}_1 + \hat{\beta}_{j+b}$ (j=1,2,…,b-1) is the impact estimate for the j^{th} (j=1, 2,…, b-1) stratum. In order to calculate an overall treatment effect estimate, the stratum-specific estimates are aggregated as follows[18]:

[2] $TE = \sum_{j=1}^{b-1} P_j \, (\hat{\beta}_1 + \hat{\beta}_{j+b}) + P_r \, \hat{\beta}_1$; where

P_j is the proportion of treatment group members in the j^{th} stratum (i.e. $\frac{n_j}{N}$, where N is the total number of awardees in the sample and n_j is the number of awardees in the j^{th} stratum), and

P_r is the proportion of treatment group members in the reference stratum.

Overall covariate-adjusted mean for non-awardees

[3] $\bar{Y}_{AdjNonAwardees} = \sum_{j=1}^{b-1} P_j \, (\hat{\beta}_0 + \hat{\beta}_{j+1}) + P_r \, \hat{\beta}_0$; where

P_j is the proportion of treatment group members in the j^{th} stratum (i.e. $\frac{n_j}{N}$, where N is the total number of awardees in the sample and n_j is the number of awardees in the j^{th} stratum), and

P_r is the proportion of treatment group members in the reference stratum.

Overall Covariate-Adjusted Mean for Awardees

[4] $\bar{Y}_{AdjAwardeesr} = \bar{Y}_{AdjNonAwardees} + TE$

[18] Stratum-specific treatment effect estimates can be aggregated to yield an overall impact estimate in a number of ways. The method chosen here—weighing the estimate for each stratum by the proportion of treatment group members in that stratum—is widely used (Morgan and Harding, 2006; Caliendo and Kopeinig, 2007).

Estimated coefficients from the impact model and the overall impact estimate are presented as well as their corresponding standard errors and p-values. Hence, for dichotomous outcomes, impact estimates are presented in the form of percentage points. For continuous outcomes, overall impact estimates in "effect size" units (e.g., Hedges' *g*) are also presented. The effect size for an impact estimate was calculated as:

[5] $$ES = \frac{TE}{PooledSD}$$

Where

TE is calculated as shown in Equation 2, and

[6] $$PooledSD = \sqrt{\frac{(N_t - 1)S_t^2 + (N_c - 1)S_c^2}{(N_t - 1) + (N_c - 1)}}$$

Where

N_t = sample size of treatment group,

N_c = sample size of comparison group,

S_t^2 = variance of the outcome for treatment group (unadjusted), and

S_c^2 = variance of the outcome for comparison group (unadjusted).

Exhibit C.6: Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Covariate	Reason for Inclusion in Impact Model	Data Source(s)	Type	Definition
Number of years between EAPSI application and Jan 1, 2010	Control for time elapsed since applying for EAPSI	NSF Extant Data	Continuous Variable	Number of years between EAPSI Application and Jan 1, 2010
Highest degree obtained as of Oct 1, 2010	Control for highest degree differences	EAPSI Survey Item D1	Categorical	3= PhD or equivalent 2= M.A./M.S. or equivalent 1= B.A./B.S. or equivalent
Imputation flag for highest degree obtained as of Oct 1, 2010	Flag to represent missing data pattern for Highest Degree variable	Abt Created	Dichotomous	1=imputed 0=not imputed
Gender	Control for gender differences. Also characteristic was not balanced in block 3.	EAPSI Applicant Survey: G1	Dichotomous	1=Female 0=Male
Under-represented minority status (URM)	Control for any differences due to URM status	EAPSI Applicant Survey: G2, G3	Dichotomous	1=Other race(s)/ethnicity 0=Asian Only or White Only
Underrepresented minority status imputation flag	Flag to represent missing data pattern for URM variable.	Abt Created	Dichotomous	1=imputed 0=not imputed
Disability status	Control for any differences due to disability status. Also characteristic was not balanced in block 2	EAPSI Survey: Item G5, G5a	Dichotomous	1=Disabled 0=Not Disabled
Imputation flag for disability status	Flag to represent missing data pattern for disability variable	Abt Created	Dichotomous	1=imputed 0=not imputed

Exhibit C.6: Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Covariate	Reason for Inclusion in Impact Model	Data Source(s)	Type	Definition
Field of study	Control for applicants field of study. Also characteristic was not balanced in block 2.	EAPSI Applicant Survey: A7	Dichotomous	1=Biological, agricultural, or environmental life sciences 0=All other disciplines 1= Physical and related sciences (includes Chemistry except biochemistry; earth, atmospheric, ocean sciences; physics) 0=All other disciplines 1= Computer and information sciences & Mathematics and statistics 0=All other disciplines 1= Psychology & social sciences &related science 0=All other disciplines 1= Engineering 0=All other disciplines 1= Health (non-STEM) 0=All other disciplines
Graduate degree program at time of application	Control for any differences due to degree at time of application. Also characteristic was not balanced in block 1, 6. Only in models that used PSA stratification.	EAPSI Applicant Survey: A5	Categorical	1=Master's 2=Doctorate 3=Other
Prior visit to host location	Characteristic was not balanced in block 1. Only in models that used PSA stratification.	EAPSI Survey: Item C3	Categorical	0=No prior visit 1=Prior visit to another site 2= Prior visit to EAPSI application Site

Exhibit C.6: Pre-Award Data Used To Construct Comparable Groups of EAPSI Fellows and Unfunded Applicants for Impact Models

Covariate	Reason for Inclusion in Impact Model	Data Source(s)	Type	Definition
Prior relevant language(s)	Characteristic was not balanced in block 5. Only in models that used PSA stratification.	EAPSI Survey: Item C4	Dichotomous	1=prior language is language of EAPSI site 0=else
Total pre-award publications	Control for prior number of publications used only in the model that examines post award publications	EAPSI Applicant Survey: C8	Continuous	Total pre-award publication
Percent publications with foreign collaborator (pre award)	Characteristic was not balanced in block 3. Only in models that used PSA stratification.	EAPSI Survey: Item C8	Continuous	Percent publications with foreign collaborator (pre award)
Imputation flag for percent publications with foreign collaborator(pre award)	Flag to represent missing data pattern for percent publications with a foreign collaborator variable. Only in models that used PSA stratification.	Abt Created	Dichotomous	1=imputed 0=not imputed
Percent publications with foreign collaborator squared(pre award)	Characteristic was not balanced in block 3. Only in models that used PSA stratification.	Abt Created	Continuous	Percent publications with foreign collaborator squared(pre award)

Sensitivity Analysis

A series of sensitivity analyses were conducted to ensure that the impact results reported are reliable and robust. In particular, the following sensitivity analyses were conducted:

Using a different number of strata in the propensity score stratification

As a sensitivity analysis, propensity blocks were combined and the impact estimate was recalculated using impact model [1] above. Blocks 1 and 2 were combined (blocks with a small number of treatment group members relative to the number of comparison group members) so we had a final total of five blocks instead of six.

Check sensitivity to matching method used

Stratification (also called interval matching) was the primary method for matching fellows and unfunded applicants. To check the sensitivity of the estimate to the matching method used, impacts were also estimated using the following propensity score matching methods: one-to-one (1:1), K-to-one (3:1), and radius (caliper) matching.[19] In its simplest form, 1:1 matching selects for each treated individual(s) the control individual with the closest propensity score (matching each fellow(s) with the most similar non-fellow). K: 1 and radius matching improves on 1:1 matching by restricting the distance of the matches. All of the matches are then pooled into matched treated and control groups and analyses were run using groups as a whole rather than as individual matched pairs. These methods discard treatment/comparison cases without matches which could potentially lead to a reduction in power[20] but could lead to higher precision. For the K:1 and radius matching weights were used in the analysis to represent the paring. The following model was then used to estimate the impact for this matching method:

$$[10]\; Y = \beta_0 + \beta_1(T_i) + \sum_{n=1}^{N} \beta_{n+1} X_i^n + \varepsilon_i$$

Where:

Y_i is the outcome of interest for individual i,

T_i is the treatment indicator for individual i (1=awardee , 0=non-awardee),

X_i^n is the n^{th} (n=1,2,…,N) covariate for individual i (such as gender, age, etc.) that are grand-mean centered, and

ε_i is the usual error term for individual i.

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19 For the radius match a caliper of 0.005 was used.

20 The reduction in power is minimal, for two reasons. First, in a two sample comparison of means, the precision is largely driven by the smaller group size (Cohen, 1988). So if the treatment groups stays the same size and only the control group decreases size, the overall power may not actually be reduced very much (Ho et al., 2007). Second, the power increases when the groups are more similar because of the reduced extrapolation and higher precision that is obtained when comparing groups that are similar versus groups that are different (Snedecor, G. W. and Cochran, W. G. 1980. *Statistical methods*, 7th ed. Ames, IA: Iowa State University Press. MR0614143).

$\hat{\beta}_0$ is the covariate-adjusted mean value of the outcome for the non-awardees,

$\hat{\beta}_1$ is the overall impact estimate (i.e. the difference between the mean value of the outcome of the awardees and non-awardees),

$\hat{\beta}_0 + \hat{\beta}_1$ is the covariate-adjusted mean value of the outcome for the awardees, and

$\hat{\beta}_{n+(b-1)}$ (n=1,2,…,N) is the estimated overall relationship between the n^{th} covariate and the outcome controlling for other covariates.

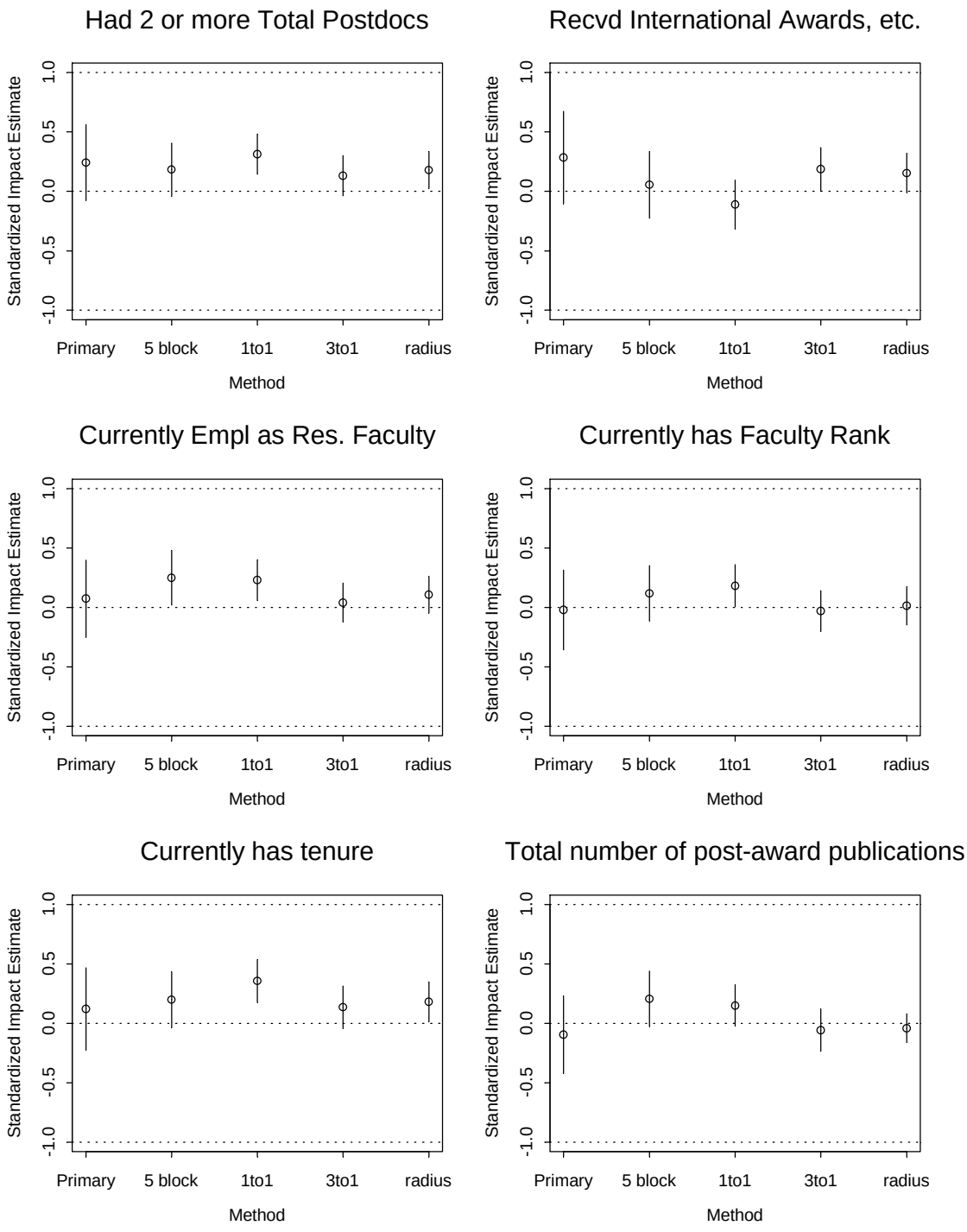
Sensitivity Checks Conclusion

Sensitivity checks were conducted to determine how confident one could be with the results from the primary method of matching i.e. to determine how sensitive the findings are to the different matching methods used.

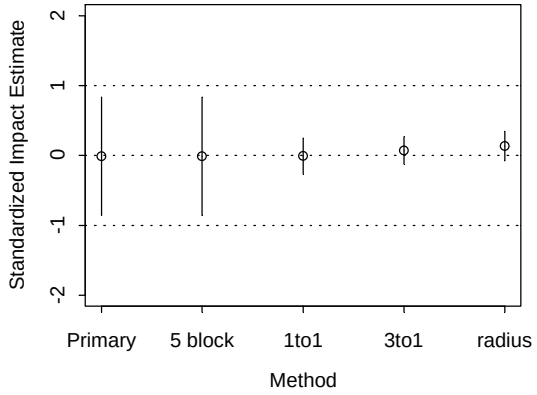
Exhibit C.7 shows the overall standardized impact estimate and a 95 percent confidence interval for the estimate for each of the outcomes from the primary method of matching. It also shows the estimate and 95 percent confidence interval for the impact estimate for each of the outcomes for the other matching techniques. The impact estimates are very similar across the primary method, the 5 blocks, 3 to 1 and radius matching methods. The estimates and corresponding confidence interval from the 1 to 1 matching were sometimes different from the other methods but this was expected. In this method the "nearest comparison neighbor" can have a propensity score that is very different than the propensity score of its match. The differences in propensity scores of the resulting matched pairs in this method are as high as 0.880. Also, over 50 percent of the matches have differences over 0.328.

The exhibit also shows that the estimates from the primary matching method are sometimes less precise (larger confidence intervals) then the estimates from other matching techniques. This is due to larger standard errors that occur because of the imbalance in the number of treatment and control members in some of the matched blocks in the primary method. Results from the 3:1 method are reported since this increases precision while maintaining close propensity score matches and retains the most respondents after stratification. This method however could be criticized for not being externally valid since we don't know if the results could be generalized to the respondents that are excluded. However, the impact estimates from this method are similar to the impact estimates from the other matching methods.

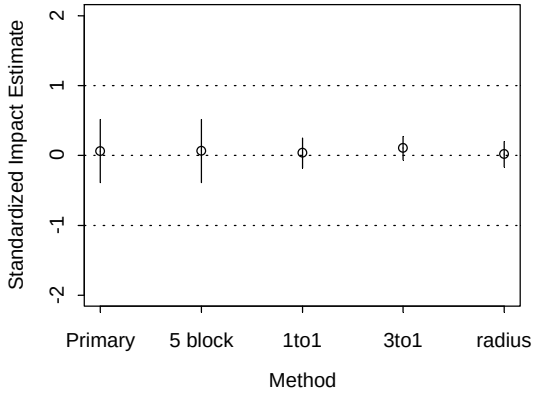
Exhibit C.7: Overall Impact Estimates and Estimates with Each Sensitivity Analysis



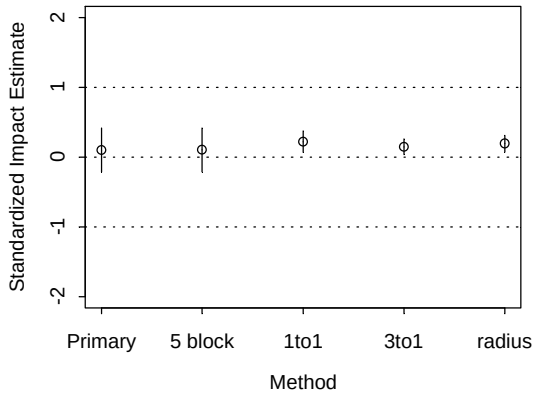
Total # of Intl. Postdocs



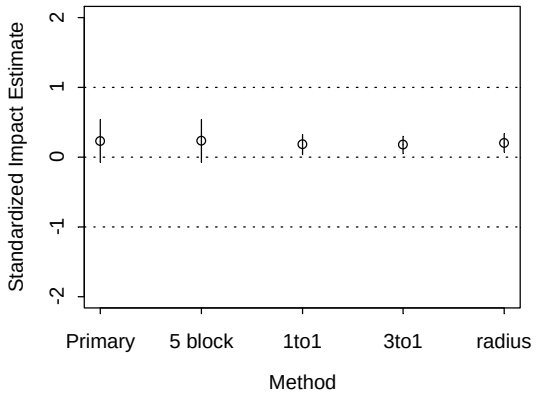
Work with Individuals in Other Countries



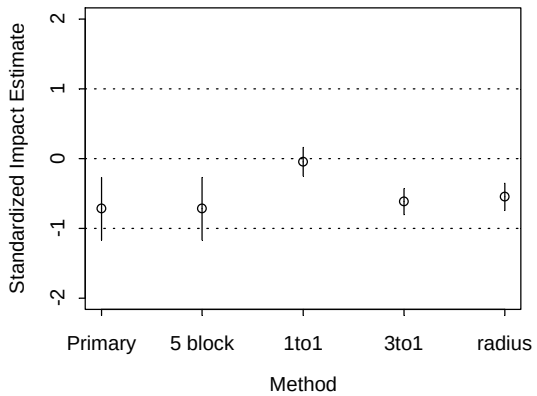
# of Pubs w/ Foreign Collab.



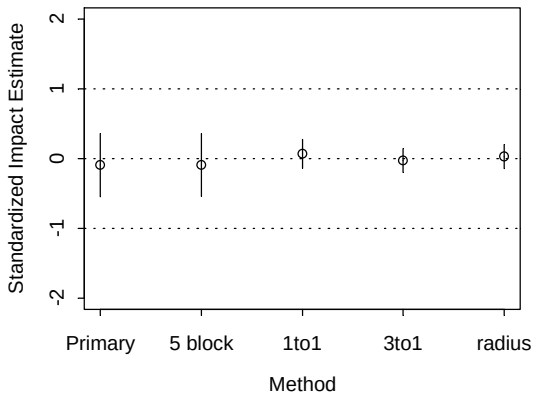
Prop. of Pubs w/ Foreign Collab.



Emply. Outside the U.S. since EAPSI



Mentored Others Traveling to Do Res.



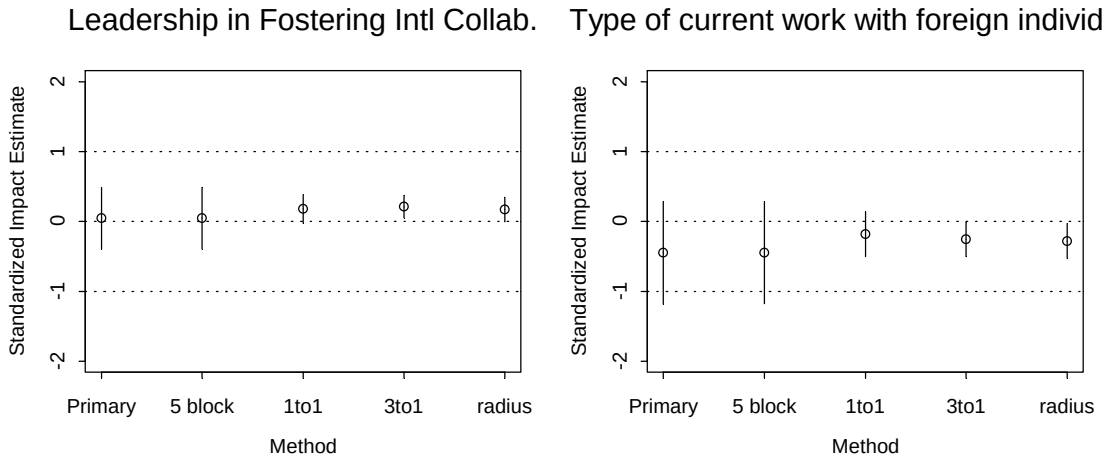


EXHIBIT SHOWS: On the far left of each graph, the impact estimate and 95% confidence interval is shown for the primary matching method (stratification). Moving from left to right, the graphs show the impact estimate and 95% confidence interval for the different matching methods.
NOTE: If the circle is above the dashed line representing 0.0 then the treatment effect is positive, if below 0 then the treatment effect is negative. If the confidence interval does not include 0 then the finding is significant.

Appendix D: Detailed Description of Benchmarking Analysis

This appendix describes the methodology used to compare the EAPSI applicants and awardees and applicants to those of a nationally-representative sample.

The 2006 and 2008 Survey of Doctoral Recipients (SDR) was utilized in this study to compare the EAPSI fellows and applicants, whose highest degree is a doctorate, to those of a nationally-representative sample of science, engineering and health (SEH) doctoral degree recipients on key employment, postdoctoral appointment, and international collaboration variables. The 2006 and 2008 National Survey of Recent College Graduates (NSRCG) was utilized in this study to compare the EAPSI fellows and applicants, whose highest degree is masters, to a nationally-representative sample of SEH master's degree recipients on key employment, and international collaboration variables.

For this study, the primary comparison group for EAPSI fellows is a propensity-score matched sample of unfunded EAPSI applicants. The SDR and NSRCG respondents were used as a secondary comparison group to assess how fellows' and all applicants' outcome indicators compare to national averages. SDR and NSRCG indicators most relevant to the study include employment sector and current position; the nature and extent of collaboration with foreign researchers. For example, comparisons included the percentage of respondents employed by academic institutions in the sample of EAPSI fellows and applicants versus the national samples (Question D2a in 2008 SDR).

Exhibit D.1 shows the applicant survey items that were designed to allow comparison of EAPSI awardees to NSRCG respondents.

Exhibit D.2 shows the applicant survey items that were designed to allow comparison of EAPSI awardees to SDR respondents.

Exhibit D.1: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 National Survey of Recent College Graduates (NSRCG)

EAPSI Applicant Survey Item	NSRCG Item	Item text	Analysis variable
D4	B23 item 4, NSRCG 2006	Work with individuals located in other countries?	**** EAPSI **** **If D4=1 then var=1;** **If D4=0 then var=0;** ****RCG**** **If B23 item 4=1 then var=1;** **If B23 item 4=0 then var=0;** **If A5=1 & A6=1 & A7=3 then var=.** **Control Variables:** - Field of study for the first Masters - Years since degree - URM - Gender
D2	B12, NSRCG 2008	Was your primary employer[1] during the week of [reference week][2] an educational institution?	**** EAPSI **** **If D2=1 then var=1;** **If D2=2 then var=0;** ****RCG**** **If B12=1 then var=1;** **If B12=2 then var=0;** **If A10=1 & A11=1 & A12=3 then var=.** **Control Variables:** - Field of study for the first Masters - URM - Gender
D3	B11 NSRCG 2008	Which one of the following best describes your primary employer during [reference week]? Self-Employed or a Business Owner Private Sector Local Government State Government U.S Federal Government U.S Military Other	**Employment Type:** ****EAPSI**** Variables coded as: 1=Yes, 0=No Report percent answering 'Yes' (1) to the following positions: - Self-Employed or a Business Owner If D2 =0 and D3=1 then var=1; 0=else (note D2=1 is included in this else) - Private Sector If D2 =0 and D3=2 then var=1; 0=else (note D2=1 is included in this else) - Local Government or State Government

Exhibit D.1: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 National Survey of Recent College Graduates (NSRCG)

EAPSI Applicant Survey Item	NSRCG Item	Item text	Analysis variable
			If D2 =0 and D3 in (3,4) then var=1; 0=else (note D2=1 is included in this else) - U.S Federal Government or U.S Military If D2 =0 and D3 in (5,6) then var=1; 0=else (note D2=1 is included in this else) - Other If D2 =0 and D3 in (7) then var=1; 0=else (note D2=1 is included in this else) ****NSRCG**** Variables coded as: 1=Yes, 0=No Report percent answering 'Yes' (1) to the following positions: - Self-Employed or a Business Owner B11 in (1, 2) & B12=2 then var=1; B11 in (3, 4, 5, 6, 7, 8, 9) & B12=2 then var=0; If A10=1 & A11=1 & A12=3 then var=. - Private Sector B11 in (3, 4) & A12=2 then var=1; B11 in (1, 2, 5, 6, 7, 8, 9) & B12=2 then var=0; If A10=1 & A11=1 & A12=3 then var=. - Local Government B11 in (5, 6) & B12=2 then var=1; B11 in (3, 4, 1, 2, 7, 8, 9) & B12=2 then var=0; If A10=1 & A11=1 & A12=3 then var=. - U.S Federal Government or U.S Military B11 in (7, 8) & A12=2 then var=1; B11 in (3, 4, 1, 2, 5, 6, 9) & B12=2 then var=0; If A10=1 & A11=1 & A12=3

Exhibit D.1: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 National Survey of Recent College Graduates (NSRCG)

EAPSI Applicant Survey Item	NSRCG Item	Item text	Analysis variable
			then var=. - Other B11 in (9) & B12=2 then var=1; B11 in (3, 4, 1, 2, 7, 8, 9, 5, 6) & B12=2 then var=0; If A10=1 & A11=1 & A12=3 then var=. **Control Variables:** - Field of study for the first Masters - Years since degree - URM - Gender

NOTES:
[1] The EAPSI question asks about primary employer and NSRCG asks about principle employer.
[2] The reference week for the 2006 NSRCG was April 1, 2006; for the 2008 NSRCG was October 1, 2008; for the EAPSI applicant survey, October 1, 2010.

Exhibit D.2: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 Survey of Doctoral Recipients

EAPSI Applicant Survey Item	SDR Item	Item text	Analysis Variable
D1c	A1 SDR 2008	During the week of [reference week][1] were you working for pay or profit? (includes postdoctoral appointments)	**Working during reference week.** ****EAPSI**** If D1=3 & D1c in (1,2) then var=1; If D1=3 & D1c in (3,4) then var=0; ****SDR**** If A1=1 then var=1; If A1=2 then var=0; Report percent answering 'Yes' (1). **Control Variables:** - The number of years between receipt of first PhD degree and the reporting year of outcomes - Field of study for the first PhD - URM - Gender
D2	A12 SDR 2008	Was your primary[2] employer during the week of [reference week] an educational institution?	****EAPSI**** If D1=3 & D2=1 then var=1; If D1=3 & D2=2 then var=0; ****SDR**** If A12=1 then var=1; If A12=2 then var=0; Report percent answering 'Yes' (1). **Control Variables:** - The number of years between receipt of first PhD degree and the reporting year of outcomes - Field of study for the first PhD - URM - Gender
D3	A11 SDR 2008	Which one of the following best describes your primary employer during [reference week]? Self-Employed or a Business Owner Private Sector Local Government State Government U.S Federal Government U.S Military Other	**Employment Type:** ****EAPSI**** Variables coded as: 1=Yes, 0=No Report percent answering 'Yes' (1) to the following positions: - Self-Employed or a Business Owner If D1=3 & D2 =0 and D3=1 then var=1; 0=else (note D2=1 is included in this else) - Private Sector

Exhibit D.2: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 Survey of Doctoral Recipients

EAPSI Applicant Survey Item	SDR Item	Item text	Analysis Variable
			If D1=3 & D2 =0 and D3=2 then var=1; 0=else (note D2=1 is included in this else) - Local Government or State Government If D1=3 & D2 =0 and D3 in (3,4) then var=1; 0=else (note D2=1 is included in this else) - U.S Federal Government or U.S Military If D1=3 & D2 =0 and D3 in (5,6) then var=1; 0=else (note D2=1 is included in this else) - Other If D1=3 & D2 =0 and D3 in (7) then var=1; 0=else (note D2=1 is included in this else) ****SDR**** Variables coded as: 1=Yes, 0=No Report percent answering 'Yes' (1) to the following positions: - Self-Employed or a Business Owner A11 in (1, 2) & A12=2 then var=1; A11 in (3, 4, 5, 6, 7, 8, 9) & A12=2 then var=0; - Private Sector A11 in (3, 4) & A12=2 then var=1; A11 in (1, 2, 5, 6, 7, 8, 9) & A12=2 then var=0; - Local Government A11 in (5, 6) & A12=2 then var=1; A11 in (3, 4, 1, 2, 7, 8, 9) & A12=2 then var=0; - U.S Federal Government or U.S Military A11 in (7, 8) & A12=2 then var=1; A11 in (3, 4, 1, 2, 5, 6, 9) & A12=2 then var=0; - Other

Exhibit D.2: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 Survey of Doctoral Recipients

EAPSI Applicant Survey Item	SDR Item	Item text	Analysis Variable
			A11 in (9) & A12=2 then var=1; A11 in (3, 4, 1, 2, 7, 8, 9, 5, 6) & A12=2 then var=0;
D2a[3]	A14[3] SDR 2008	Currently employed as research faculty at Two-year college, community college or technical institute, 4-year college/university, medical school, or university-affiliated research	**Currently employed at:** ****EAPSI**** If D1=3 & D2a in (2,3,4,5,6) & D2b_3=1 then var=1 If D1=3 & D2a in (2,3,4,5,6) & D2b_3=0 then var=0 ****SDR**** If A13 in (2,3,4,5,6) & A14_3=1 then var=1 If A13 in (2,3,4,5,6) & A14_3=0 then var=0 Report percent answering 'Yes' (1). **Control Variables:** - The number of years between receipt of first PhD degree and the reporting year of outcomes - Field of study for the first PhD - URM - Gender
D2b[4]	A14[4] SDR 2008	During the week of [reference week] what type of academic position did you hold at this institution?[5] President, Provost, or Chancellor (any level) Dean (any level), department head or chair Research faculty, scientist, associate or fellow Teaching faculty Adjunct faculty Other (please specify):	**Academic Position** ****EAPSI**** Variables coded as: 1=Yes, 0=No Report percent answering 'Yes' (1) to the following positions:President, Provost, or Chancellor (any level) If D1=3 & D2a in (2,3,4,5,6) & D2b_1=1 then var=1 If D1=3 & D2a in (2,3,4,5,6) & D2b_1=0 then var=0 Dean (any level), department head or chair If D1=3 & D2a in (2,3,4,5,6) & D2b_2=1 then var=1 If D1=3 & D2a in (2,3,4,5,6) & D2b_2=0 then var=0 Research faculty, scientist, associate or fellow

Exhibit D.2: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 Survey of Doctoral Recipients

EAPSI Applicant Survey Item	SDR Item	Item text	Analysis Variable
			If D1=3 & D2a in (2,3,4,5,6) & D2b_3=1 then var=1 If D1=3 & D2a in (2,3,4,5,6) & D2b_3=0 then var=0 Teaching faculty If D1=3 & D2a in (2,3,4,5,6) & D2b_4=1 then var=1 If D1=3 & D2a in (2,3,4,5,6) & D2b_4=0 then var=0 Adjunct faculty If D1=3 & D2a in (2,3,4,5,6) & D2b_5=1 then var=1 If D1=3 & D2a in (2,3,4,5,6) & D2b_5=0 then var=0 Other (please specify) If D1=3 & D2a in (2,3,4,5,6) & D2b_6=1 then var=1 If D1=3 & D2a in (2,3,4,5,6) & D2b_6=0 then var=0 ****SDR**** Variables coded as: 1=Yes, 0=No Report percent answering 'Yes' (1) to the following positions: President, Provost, or Chancellor (any level) If A13 in (2,3,4,5,6) & A14_1=1 then var=1 If A13 in (2,3,4,5,6) & A14_1=0 then var=0 Dean (any level), department head or chair If A13 in (2,3,4,5,6) & A14_2=1 then var=1 If A13 in (2,3,4,5,6) & A14_2=0 then var=0 Research faculty, scientist, associate or fellow If A13 in (2,3,4,5,6) & A14_3=1 then var=1 If A13 in (2,3,4,5,6) & A14_3=0 then var=0

Exhibit D.2: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 Survey of Doctoral Recipients

EAPSI Applicant Survey Item	SDR Item	Item text	Analysis Variable
			Teaching faculty If A13 in (2,3,4,5,6) & A14_4=1 then var=1 If A13 in (2,3,4,5,6) & A14_4=0 then var=0 Adjunct faculty If A13 in (2,3,4,5,6) & A14_5=1 then var=1 If A13 in (2,3,4,5,6) & A14_5=0 then var=0 Other (please specify) If A13 in (2,3,4,5,6) & A14_6=1 then var=1 If A13 in (2,3,4,5,6) & A14_6=0 then var=0 **Control Variables:** - The number of years between receipt of first PhD degree and the reporting year of outcomes - Field of study for the first PhD - URM - Gender
D2c[4]	A15[4] SDR 2008	Currently has faculty rank of Assistant, Associate or Full Professor	**Faculty Rank:** ****EAPSI**** If D1=3 & D2c in (3,4,5) then var=1 If D1=3 & D2c in (6,7,8) then var=0 ****SDR**** If A15 in (3,4,5) then var=1 If A15 in (6,7,8) then var=0 Report percent answering 'Yes' (1). **Control Variables:** - The number of years between receipt of first PhD degree and the reporting year of outcomes - Field of study for the first PhD - URM - Gender.
D2d[4]	A16[4] SDR 2008	What was your tenure status?	**Tenure Status:** ****EAPSI**** If D1=3 & D2d=3 then var=1 If D1=3 & D2d in (4,5) then var=0

Exhibit D.2: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 Survey of Doctoral Recipients

EAPSI Applicant Survey Item	SDR Item	Item text	Analysis Variable
			****SDR**** If A16=3 then var=1 If A16 in (4,5) then var=0 Report percent answering 'Yes' (1). **Control Variables:** - The number of years between receipt of first PhD degree and the reporting year of outcomes - Field of study for the first PhD - URM - Gender
D4	A27, Item 4 SDR 2006	In performing the primary job you held during the week of [reference week], did you work with individuals located in countries other than the US?	**** EAPSI **** **If D4=1 then var=1;** **If D4=0 then var=0;** ****SDR**** **If A27 item 4=1 then var=1;** **If A27 item 4=0 then var=0;** Report percent answering 'Yes' (1). **Control Variables:** - The number of years between receipt of first PhD degree and the reporting year of outcomes - Field of study for the first PhD - URM - Gender
D6, item 1	C1, Item 2 SDR 2008	EAPSI: Peer-reviewed Journal articles SDR: Articles, (co)authored by you, have been accepted for publication in a refereed professional journal?	**Number of journal articles published** **EAPSI** D1=3 then Var=number of articles(0,1,2,…..) **SDR** Var=number of articles(0,1,2,….) **Control Variables:** - Field of study for the first PhD - URM - Gender - The number of years between application to EAPSI and survey

Exhibit D.2: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 Survey of Doctoral Recipients

EAPSI Applicant Survey Item	SDR Item	Item text	Analysis Variable
			reference date. Everyone in the SDR sample reported publications in the last 5 years.
D6, item 2	C1, item 1 SDR 2008	EAPSI: Peer-reviewed conference publications (e.g. abstracts, conference papers, posters) SDR: Papers have you (co)authored for presentation at regional, national or international conferences? *(Do not count presentations of the same work more than once.)*	**Number of conference publications** **EAPSI** D1=3 then Var=number of conference publications(0,1,2,.....) **SDR** Var=number of conference publications(0,1,2,.....) Report percent answering 'Yes' (1). **Control Variables:** - Field of study for the first PhD - URM - Gender - EAPSI only: The number of years between application to EAPSI and survey reference date. Everyone in the SDR sample reported publication in the last 5 years.
D6, item 3	C2, C3, item 1 and 2 SDR 2008	EAPSI: Patents, registered or pending SDR: Since October 2003, have you been named as an inventor on any application for a U.S. patent? or How many applications for U.S. patents have named you as an inventor? or How many U.S. patents have been granted to you as an inventor?	**Number of patents** **EAPSI** D1=3 then Var=number of patents(0,1,2,.....) **SDR** If C2=2 then var=0 Else Var=sum(C3.1:C3.2) **Control Variables:** - Field of study for the first PhD - URM - Gender - EAPSI only: The number of years between application to EAPSI and survey reference date. Everyone in the SDR sample reported publication in the last 5 years so this was not a control.
D6, item 4	C1, item 3 SDR 2008	EAPSI: Book Chapter(s)	**Number of book chapter(s)** **EAPSI**

Exhibit D.2: EAPSI Applicant Survey Items Comparable to Items on the 2006/2008 Survey of Doctoral Recipients

EAPSI Applicant Survey Item	SDR Item	Item text	Analysis Variable
		SDR: Books or monographs, (co)authored by you, have been published or accepted for publication?	D1=3 then Var=number of chapters(0,1,2,…..) **SDR** Var=number of chapters(0,1,2,…..) **Control Variables:** - Field of study for the first PhD - URM - Gender - EAPSI only: The number of years between application to EAPSI and survey reference date. Everyone in the SDR sample reported publication in the last 5 years.

NOTES:
[1] The reference week for the 2006 SDR was April 1, 2006; for the 2008 SDR was October 1, 2008; for the EAPSI applicant survey, October 1, 2010.
[2] The EAPSI question asks about primary employer and SDR asks about principle employer.
[3] For EAPSI, D2a is presented only if D2=Yes. For the 2006 SDR, Item A13 applies only if A12=Yes.
[4] For EAPSI, this item is only presented if D2=Yes and D2a not equal to preschool, elementary, middle, secondary school; for the 2006 SDR, this item applies only if A12=yes and A13 not equal to preschool, elementary, middle, secondary school
[5] Items have different response options. In EAPSI we collapsed Research Assistant, Teaching Assistant, and Postdoc into "other." Postdocs would skip out of D2b, so EAPSI did not have options for Research Assistant, or Teaching Assistant. For the SDR data we grouped Research Assistant, Teaching Assistant into the Other category.

Limitations of These Comparisons

There were four noteworthy limitations of these data. First, the SDR and NSRCG surveys were not designed to measure many of the outcomes that are pertinent to this study. Research productivity, for example, is a particularly notable omission. The use of the SDR and NSRCG as a national comparison is limited to the subset of items such as current employment, number of international collaborations, and a few others.

The second limitation of the SDR and NSRCG data is the difference in timing, as this study collected data in 2011, whereas the SDR and NSRCG data come from surveys administered in 2006 and 2008. As a result, when the year of first doctoral or masters degree attainment was used as a variable on which to compare the study population to the SDR or NSRCG population, the groups are out of phase by two to five years, depending on the SDR or NSRCG cycle. For example, 2006 SDR respondents who earned their PhDs in 2000 would have had six years to achieve their outcomes by the time of the data collection. In contrast, respondents to the EAPSI survey who earned their PhD in the same year (2000) would have had 11 years to achieve outcomes, possibly biasing any comparison of the two groups. To mitigate this problem, comparisons controlled for the number of

years between the receipt of first PhD or first Master's degree and the reporting year of outcomes in the analyses.

The third limitation is that the sampling frame for the SDR and NSRCG excludes individuals living outside of the United States during the survey reference period. This methodology creates a sample bias relevant to the EAPSI program. The sampling bias is compounded in that individuals excluded from the initial SDR/NSRCG would be excluded from any subsequent follow-up SDR/NSRCG surveys. As a result, the SDR/NSRCG sample might include fewer individuals likely to be engaged in international research collaboration.

Finally, the SDR and NSRCG samples have the potential to include some EAPSI recipients. It was not possible to obtain personal identifying information for SDR or NSRCG respondents, so EAPSI participants could not be removed from the SDR or NSRCG sample. The 2006 SDR sample consisted of 30,817 individuals. The 2008 SDR sample consisted of 29,974 individuals. The 2006 NSRCG sample of master recipients consisted of 5,247 individuals. The 2008 NSRCG sample consisted of 5,442 individuals. Since there are only 327 EAPSI awardees whose highest degree is a Master's and 501 EAPSI awardees whose highest degree is a PhD in the sample, the potential overlap is very small (<1%) hence these were treated as independent samples.

Performing the Calculations

The goal of the benchmarking calculation was to perform a test of whether the difference between the two adjusted means from the two samples is equal to zero. Exhibit D.2 shows a specification of the hypothesis test and the method for calculating the p-value from the test is shown. Exhibit D.3 shows a method for calculating the variance (and standard error) of the difference of the means and Exhibit D.4 shows a method for calculating the variance (and standard error) of the difference of the proportions (Survey Sampling by L Kish.).

Exhibit D.2: Hypothesis Testing

Let $\bar{x}_1$ denote the estimated mean from the IFRP sample of size n_1.

$\bar{x}_2$ denote the mean from the SDR sample of size n_2.

$SE(\bar{x}_2 - \bar{x}_1)$ denote the standard error of the difference between the two sample means.

$$H_o : \bar{x}_1 - \bar{x}_2 = 0 \quad vs \quad H_a : \bar{x}_1 - \bar{x}_2 \neq 0$$

Test Statistic is:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - 0}{SE(\bar{x}_1 - \bar{x}_2)}$$

If the observed value of *t* as calculated above is greater than the critical value from the t-distribution with n –2 degrees of freedom and α=0.05, the null hypothesis will be rejected at the p<0.05 level.

OR

Let p_1 denote the estimated proportion from the IFRP sample of size n_1.

p_2 denote the estimated proportion from the SDR sample of size n_2.

$SE(p_1 - p_2)$ denote the standard error of the difference between the two sample proportion.

$$H_o : p_1 - p_2 = 0 \quad vs \quad H_a : p_1 - p_2 \neq 0$$

Let the *z* be the standardized deviate, calculated as:

$$z = \frac{(p_1 - p_2) - 0}{SE(p_1 - p_2)}$$

Compare *z* to the quantiles of a standard normal distribution, N(0,1), to find the two-sided probability of obtaining a deviate with absolute value that is as large or larger than *z*. If the absolute value of *z* is greater than 1.96, the null hypothesis will be rejected at the p<0.05 level.

Exhibit D.3. Estimating the Variance of the Difference in Two Sample Means

Let $\bar{x}_1$ denote the estimated mean from the IFRP sample of size n_1. Let $\bar{x}_2$ denote the mean from the SDR sample of size n_2. The difference between the two sample means was tested. The estimated variance of the difference between the two sample mean is written as

$$v(\bar{x}_1 - \bar{x}_2) = v(\bar{x}_1) + v(\bar{x}_2) - 2\,\mathrm{cov}(\bar{x}_1, \bar{x}_2)$$

Under simple random sampling, the variance of the difference can be written as

$$v(\bar{x}_1 - \bar{x}_2) = v(\bar{x}_1) + v(\bar{x}_2) - \frac{2\rho_{x_1x_2} m\sqrt{v(\bar{x}_1)v(\bar{x}_2)}}{\sqrt{n_1 n_2}}$$

$v(\bar{x}_1)$ is the estimated variance of the mean based on the EAPSI sample of n_1 units, $v(\bar{x}_2)$ is the estimated variance of the SDR mean based on n_2 units and m is the amount of overlap between the two samples. The correlation ($\rho_{x_1x_2}$) is estimated based on the overlap. Since m is almost 0 the variance can be estimated as:

$$v(\bar{x}_1 - \bar{x}_2) = v(\bar{x}_1) + v(\bar{x}_2)$$

The variance under the sample[21] design is obtained from proc survey reg for the first mean and the second mean. The square root of the variance gives the standard error of the difference in the two means, which can be used in a statistical test.

[21] The EAPSI sample was treated as a simple random sample or "pseudo-sample" since awardees from a different grant period might result in a different estimate.

Exhibit D.4: Estimating the Variance of the Difference in Two Sample Proportions Based on Independent[22] Samples.

Let p_1 denote the estimated proportion from the IFRP sample of size n_1. Let p_2 denote the proportion from the SDR sample of size n_2. The difference between the two sample means was tested. The estimated variance of the difference between the two sample mean is written as

$$v(p_1 - p_2) = v(p_1) + v(p_2) - 2m\text{cov}(p_1, p_2),$$

Since m is almost 0 one can write the estimated variance of the difference between the two proportions as:

$$v(p_1 - p_2) = v(p_1) + v(p_2)$$

One can get the variance under the sample[23] design from proc survey reg for the first proportion and the second proportion. The square root of the variance gives the standard error of the difference in the two means, which can be used in a statistical test.

Estimation of Mean and Variance

As mentioned above SAS proc survey reg was used to obtain the adjusted mean and standard error. The following regression model was used to estimate the adjusted mean and standard error for each sample:

$$Y_i = \beta_0 + \sum_{n=1}^{N} \beta_n X_i^n + \varepsilon_i$$

Where:

Y_i is the outcome of interest for individual i,

X_i^n is the n^{th} (n=1,2,…,N) covariate for individual i (such as gender, URM, number of years between PHD and survey date, etc.) that are grand-mean centered across the samples, and

ε_i is the usual error term for individual i.

Interpretation of Parameters

Interpretation of the coefficients in the model is as follows:

[22] The EAPSI sample is a potentially a VERY small proportion (close to 0) of the SDR sample so these were treated as independent samples.

[23] The EAPSI sample is treated as a simple random sample or "pseudo-sample" since awardees from a different grant period might produce a different estimate.

$\hat{\beta}_0$ is the covariate-adjusted mean value of the outcome for the sample,

$\hat{\beta}_n$ (n=1,2,…,N) is the estimated overall relationship between the n^{th} covariate and the outcome controlling for other covariates.

Appendix E: Surveys

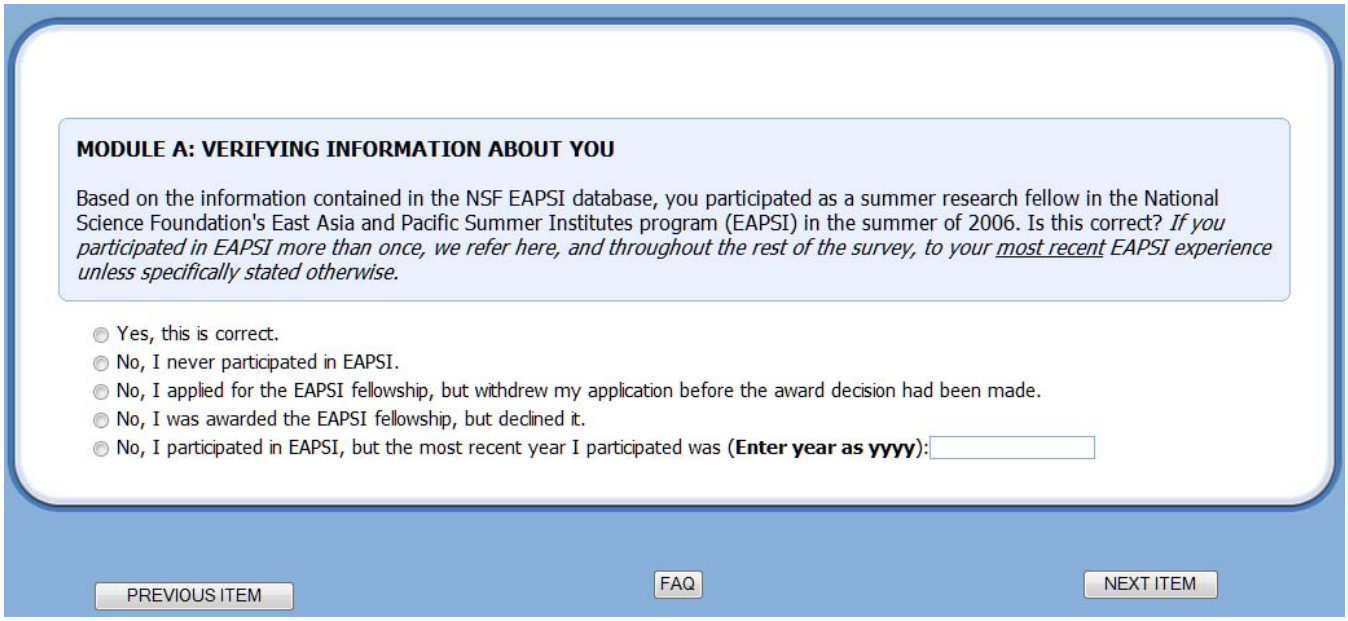
East Asia and Pacific Summer Institutes (EAPSI) Program

Applicant Survey Items

Programming notes appear in red or brown text throughout.
Hyperlinked text will appear embossed and underlined in this document but should not be formatted this way onscreen unless noted (underlining is fine except for email addresses, but embossing is not).

General guidelines:

Each screen displayed one question at a time unless otherwise indicated.
Each screen displayed a standard set of Navigaton buttons shown below.



Some items contained placeholders for fields that were programmed to be auto-filled from the sample file for each respondent. These fields are enclosed in [brackets] and printed in brown.

Textboxes for open-text responses are indicated with [textbox, 150] where the number indicates the length of the field (how many characters the respondent may type)

REMINDERS for BLANK RESPONSES and DEFAULTS for SKIP PATTERNS if RESPONSE was MISSING

- No items required a response.
- No items required a reminder to enter an answer/select a response unless indicated below. If a reminder was needed for the first time user leaves an item blank, the item was re-displayed adding the text below shown on-screen in **bold, red text.**

These reminders and defaults are given at the end of this document.

Sample variables.

AwdStatus: Fellow, Unfunded: Two groups of respondents will be tracked using the sample file: Fellows, and Unfunded Applicants. In the sample file, Awardee = FELLOW and Declinee = UNFUNDED APPLICANT.

PI_Name will contain First Name, Middle Name, Last Name. Note that Middle Name may be an initial or may be blank.

EAPSI_year: The year for which the applicant applied to participate in EAPSI

EAPSI_app_site: The name of the site to which applicant applied (as first choice)

EAPSI_actual_site: The site which a Fellow actually visited for the EAPSI fellowship

Dropdown EAPSI site menu: When clicked and held this dropdown menu allows R to choose one of the following:

[blank]
Australia
China
Japan
Korea
New Zealand
Singapore
Taiwan

Once a selection is made, the variable EAPSI_app_site or EAPSI_actual_site should be set to this value.

University: The US graduate institution where an EAPSI applicant was enrolled

CurrGrad = 1 if Item F1c = 3 after Respondent completes item (see below); **CurrGrad** = 0 otherwise.

Introductory screen:

Survey of former applicants to the National Science Foundation's East Asia and Pacific Summer Institutes (EAPSI) program

Welcome and thank for your interest in this study. This survey is being conducted by Abt Associates Inc. and our subsidiary, AbtSRBI, for the National Science Foundation (NSF), to learn about former graduate students who applied to NSF's East Asia and Pacific Summer Institutes (EAPSI) program. This survey will give NSF information about the professional characteristics and international collaborations of U.S. scientists and engineers and help NSF improve programs intended to foster a globally engaged scientific and engineering workforce. You are receiving this survey because you are listed in the NSF database as a former applicant to EAPSI. We estimate that it will take approximately 30 minutes to complete the survey.

NSF's records indicate that you applied for a summer graduate research fellowship in one of the following sites between 1999 and 2010:

Japan	**Australia**
Korea	**New Zealand**
Taiwan	**Singapore**
China	

These graduate summer fellowships are part of NSF's East Asia and Pacific Summer Institutes program (EAPSI). If you do not recall applying to this program, please click here:

I don't recall applying

Otherwise, please continue. The next page has important information about this study.

Continue

Click on "Continue" directs R to Screen 2
Click on "I don't recall" directs R to Confirm Fellowship screen

Screen 2

EAPSI Applicant Survey

Confidentiality and Participation

Participation in the survey is voluntary and nonparticipation will have no impact on you or your institution. You may skip questions on the survey or discontinue participation at any time. There are minimal risks associated with your participation. We take your privacy very seriously. Your responses to this survey will be protected under the Privacy Act. There is minimal risk of breach of confidentiality, and we have put in place procedures to minimize this risk. Reports will never identify you by name, and information from the study will only be reported in the aggregate at the program level, combined with about 500 other responses. When we receive your survey we will detach and store separately your name and other identifying information that could be used to link you to your survey responses. Survey responses will be stored on a secure drive that is only accessible to members on the study team. Only study team web technicians and data analysts from Abt Associates and AbtSRBI will see individual responses that can be linked to you. Survey data files will be shared with NSF at the end of the study, only after study team members have examined the data to be free of any information that could help identify you; this cleaning includes procedures to limit someone from inferring your identity by analyzing non-identifying data. Hence, we encourage you to respond candidly about your experiences. Separate from your individual responses to the survey we will provide NSF any updated contact information we have found or requested from you. None of this contact information will be linked in any way to your survey responses. At the conclusion of the study, Abt Associates and AbtSRBI will destroy all records, electronic or otherwise, that link you to your survey responses.

Questions

If you have questions about the study, please contact the study director, Alina Martinez of Abt Associates Inc. at (866) 421-6223 (toll free within the U.S.) or email her at EAPSI_survey@abtassoc.com. You may also contact the evaluation's program officer at NSF, John Tsapogas (tsapoga@nsf.gov). If you have questions about your rights as a research participant, you may contact Teresa Doksum, the Abt Institutional Review Board Administrator at (877) 520-6835 (toll free within the U.S.) or by email: irb@abtassoc.com. To learn more about this study, please refer to the **Frequently Asked Questions** page.

Consent

Please click on "Begin" if you agree to participate in this study. **BEGIN**

Click on BEGIN takes R to Navigation Screen

This study's IRB approval number is #0494, valid from 8/6/2010 to 8/5/2011. For questions, please contact Teresa Doksum, IRB Administrator, Abt Associates, at IRB@abtassoc.com.

The valid OMB control no. for this information collection is 3145-0214. (Expires on 12/31/13)

Navigation screen:

EAPSI Applicant Survey

Navigating through the survey:

As you work through the survey, your responses are automatically saved. You may change a response by clicking on the **PREVIOUS ITEM** button. Use the **NEXT ITEM** button to advance to the next question. At any time, you may close your browser if you wish to return and finish at a later time. When you log back in, the survey will take you to where you left off. On each page of the survey, a **FAQ** button is provided if you have a question during the survey or need information about how to contact the survey administrator.

When you have completed the survey, please click on the **SUBMIT** button at the end of the survey. You may submit the survey even if there are some questions that you choose not to answer.

NEXT

FAQs are Optional screens, displayed only if R clicks on **Frequently Asked Questions**

FREQUENTLY ASKED QUESTIONS

What is the East Asia and Pacific Summer Institute (EAPSI) Program?

The East Asia and Pacific Summer Institute (EAPSI) Program is a National Science Foundation (NSF) program that provides funding for U.S. graduate students to spend eight to ten weeks collaborating with a host researcher in one of seven sites in the East Asia and Pacific region: Australia, China, Japan, Korea, New Zealand, Singapore, and Taiwan.

Why are you doing this study?

NSF is interested in learning about the characteristics of current and former graduate students who applied to participate in the EAPSI program sometime between 1999 to 2009. Information about the domestic and international experiences of EAPSI participants and non-participants will help NSF understand the usefulness and relevance of international research training for scientists and engineers. Information from this study will be used to describe the characteristics and subsequent career paths of graduate students who expressed interest in pursuing an international collaboration.

Why have I been selected to participate in this survey?

You have been selected to participate because we have identified you as having applied to the EAPSI program while you were a graduate student.

How did you get my contact information?

We identified you from records maintained by the National Science Foundation on prior EAPSI applicants. We then obtained your contact information through an internet search.

How long will this survey take to complete?

We estimate that the survey will take about 30 minutes.

How will you use my comments?

Responses from all survey respondents will be used to answer questions about the graduate training, international experience, and career paths of applicants to the EAPSI program between 1999 and 2009.

Has this study been reviewed and approved by an institutional review board?

Yes, the study was approved by Abt Associates' Institutional Review Board. If you have any concerns about your participation in this survey, please contact Teresa Doksum, Institutional Review Board Administrator at Abt Associates, at (877) 520-6835 or via email at irb@abtassoc.com.

Who is funding the study?

The study has been funded by the National Science Foundation under contract GS-10F-0086K. Abt Associates and AbtSRBI will complete the study.

Who are Abt Associates Inc and AbtSRBI?

Abt Associates is an independent research firm headquartered in Cambridge, Massachusetts. AbtSRBI is a wholly-owned subsidiary of Abt Associates specializing in large-scale data collection and public opinion research. NSF has contracted with Abt Associates and AbtSRBI to design and implement a survey of graduate students who applied to NSF's EAPSI program.

EAPSI Applicant Survey

Please note: In this survey, we will refer to East Asia and Pacific Summer Institute (EAPSI) "sites," or "locations" rather than EAPSI "countries." For example, Australia, China, Korea, Japan, New Zealand, Singapore, and Taiwan were EAPSI sites in 2010.

MODULE A: VERIFYING INFORMATION ABOUT YOU
To begin, we'd like to confirm that we've reached the appropriate person.

A1. Based on the information that you provided to NSF in your application, your name is [First Name, Middle Name/initial, Last Name]. Is this correct?

- ❑ No, my name has changed or my name is misspelled above. My name is: [textbox, 75]

→ **FELLOWS** **GOTO A2.1**
UNFUNDED APPLICANTS **GOTO A2.2**

- ❑ No, I'm not the person named above. → **EXIT SCREEN**
- ❑ Yes, this is correct. →

FELLOWS **GOTO A2.1**
UNFUNDED APPLICANTS **GOTO A2.2**

Programmer note: text highlighted in yellow is new/changed

[**Former Fellows only**]:

A2.1 Based on the information contained in the NSF EAPSI database, you participated as a summer research fellow in the National Science Foundation's East Asia and Pacific Summer Institutes program (EAPSI) in the summer of [**EAPSI_year**]. Is this correct?

If you participated in EAPSI more than once, we refer here, and throughout the rest of the survey, to your most recent EAPSI experience unless specifically stated otherwise.

- ❑ Yes, this is correct. → **GOTO A3**
- ❑ No, I never participated in EAPSI. → **CONFIRM FELLOWSHIP SCREEN Section R**
- ❑ No, I applied for the EAPSI fellowship, but withdrew my application before the award decision had been made. → **EXIT SCREEN**
- ❑ No, I was awarded the EAPSI fellowship, but declined it. →**EXIT SCREEN**
- ❑ No, I participated in EAPSI, but the most recent year I participated was (**Enter year as yyyy**): [textbox, 4]. → **GOTO A3 Set EAPSI_year = entered year. Prompt R to correct entry: "Please type a four-digit year between 1998 and 2010"**

[**Unfunded applicants only**]

A2.2. Based on the information contained in the NSF EAPSI database, you most recently applied for a [EAPSI_YEAR] EAPSI summer research fellowship, but did not participate in this fellowship. Is this correct?

- ❑ Yes, this is correct. → **GOTO A3**
- ❑ No, I did participate in an EAPSI fellowship: my fellowship took place in the summer of (**Enter year as yyyy**): [textbox, 4] [**Prompt R to correct entry: "Please type a four-digit year between 1990 and 2010"]** in [**Select locationsite**: [dropdown EAPSI site menu]. → **GOTO CONFIRM FELLOWSHIP SCREEN Section S Set EAPSI_year = entered year; Set EAPSI_actual_site = Selection**
- ❑ No, I never applied for this program. → **CONFIRM FELLOWSHIP SCREEN Section S**

A3. Based on the information contained in the NSF database, when you most recently applied for an EAPSI fellowship, the first choice of host site you listed was [**EAPSI_app_site**]. (If you received an EAPSI fellowship, you may have visited a different site, but here we want to know what site you listed in your application as your first choice.)

Is this correct?

- ❑ Yes, [**EAPSI_app_site**] was my first choice
- ❑ No, the first choice I listed on my most recent application for an EAPSI fellowship was: (**Select site**): [dropdown EAPSI site menu]. **Set EAPSI_app_site to selection.**
- ❑ I do not recall

Fellows → Goto A3a.
Unfunded applicants → Goto A4.

A3a. [Fellows only]: Some EAPSI fellows did not receive their first choice of host site. In which site was your EAPSI fellowship? **Select site**: [dropdown EAPSI site menu] *If you have held more than one EAPSI fellowship, please respond based on your most recent fellowship.* **Set EAPSI_actual_site = selection**

A4. Based on the information that you provided to NSF in your application, you were enrolled at [University] when you most recently applied for an EAPSI fellowship. Is this correct?

- ❑ Yes
- ❑ No, I was enrolled as a graduate student at (**Enter full name of graduate instituition without abbreviations**): [textbox, 100]. **Set UNIVERSITY = text entered**

A5. What graduate degree were you pursuing when you most recently applied for the summer EAPSI fellowship?

- ❑ Master's degree (MA, MS)
- ❑ Doctoral degree (PhD, EdD, MD, joint MD/PhD, PsyD, ScD)
- ❑ Other – specify: [textbox, 50]

A5a. As of [October 1st, 2010], had you earned this degree?

- ❑ Yes → Go to A5b
- ❑ No → Go to A6

A5b. What month and year did you receive this degree?

___|_____ (mm|yyyy) **Prompt R to correct entry: "Please enter a two-digit month (or leave it blank) and a four-digit year (or leave it blank)."**

A6. In what month and year did you first enroll as a graduate student at [University]? Enter two-digit month and four-digit year: [_ _|_ _ _ _ (mm|yyyy)] **Prompt R to correct entry: "Please enter a two-digit month (or leave it blank) and a four-digit year (or leave it blank)."**

A7. What discipline were you studying as a graduate student when you applied for an EAPSI fellowship? Please select the field that best matches your discipline. First, indicate which one of four broader areas in which your discipline falls: *Check one only:*

- ❑$_1$ Sciences [no hyperlink]
  (e.g., Biological/Life, Chemical, Computer/Information, Environmental, Earth/Atmospheric/Oceanographic, Geosciences, Mathematical/Statistical, Physics, Psychology)

- ❑$_2$ Social Sciences [no hyperlink]
  (e.g., Economics, Sociology, Anthropology/Archaeology, Political Science, Geography, Linguistics, other)

- ❑$_3$ Health/Medical fields[no hyperlink]

- ❑$_4$ Engineering [no hyperlink]

display one of three screens based on choice above:

1 Science screen
2 Social Science, Health screen
3 Social Science, Health screen
4 Engineering screen

The next three pages should each be a separate screen. After R hits NEXT, go to Item B1

Science Fields

For Science/Math Education select the primary scientific or mathematical field, or select Social Sciences or Health/Medical and see "OTHER Social Sciences: 621: Education, General"

To view other fields (Social Science, Health/Medical, Engineering), please select Go back to the 4 broad categories to change your selection.

Agricultural/food sciences	❍ Animal sciences ❍ Food sciences/technology	❍ Plant sciences ❍ OTHER agricultural sciences
Biological sciences *Bioengineering, see ENGINEERING, next page*	❍ Biochemistry/biophysics ❍ Biology, general ❍ Botany ❍ Cell/molecular biology ❍ Ecology ❍ Genetics, animal/plant	❍ Microbiological sciences/immunology ❍ Nutritional sciences ❍ Pharmacology, human/animal ❍ Physiology and pathology, human/animal ❍ Zoology, general ❍ OTHER Biological sciences
Environmental life sciences	❍ Environmental science/studies	❍ Forestry sciences
Computer and information sciences *For Computer Engineering, see ENGINEERING, next page*	❍ Computer/information sciences, general ❍ Computer programming ❍ Computer science	❍ Computer systems analysis ❍ Information services/systems ❍ OTHER computer/information sciences
Mathematics and statistics	❍ Applied mathematics ❍ Mathematics, general ❍ Operations research	❍ Statistics ❍ OTHER mathematics
Chemistry, except biochem	❍ Chemistry except biochemistry (*biochemistry, see Biological sciences*)	
Earth, atmospheric, and ocean sciences	❍ Atmospheric sciences/meteorology ❍ Earth sciences ❍ Geology	❍ Geological sciences, other ❍ Oceanography ❍ OTHER physical sciences
Physics *Biophysics, see Biological Sciences*	❍ Astronomy/astrophysics	❍ Physics
Psychology	❍ Clinical psychology ❍ Counseling ❍ Educational psychology ❍ Experimental psychology	❍ General psychology ❍ Industrial/organizational psychology ❍ Social psychology ❍ OTHER psychology

GO BACK TO 4 BROAD CATEGORIES NEXT ITEM

Social Sciences and Health/Medical fields

For Science/Math Education select the primary scientific or mathematical field (click on Science), or see below "OTHER Social Sciences: 621: Education, General"

To view other fields (Science, Engineering), please select Go back to the 4 broad categories to change your selection.

Economics	❍ Agricultural economics	❍ Economics
Political and related sciences	❍ International relations ❍ Political science/government	❍ Public policy studies
Sociology/Anthropology	❍ Anthropology/archaeology ❍ Criminology	❍ Sociology
OTHER social sciences	❍ Area/ethnic studies ❍ Education, general ❍ Geography ❍ History of science	❍ Linguistics ❍ Philosophy of science ❍ OTHER social sciences
Health	❍ Audiology/speech pathology ❍ Health services administration ❍ Health/medical assistants ❍ Health/medical technologies ❍ Medical preparatory programs (e.g., pre-dentistry, pre-medical, pre- veterinary) ❍ Medicine (e.g., general, internal, orthopedic, surgical, dentistry, optometry, osteopathic, podiatry, veterinary)	❍ Nursing (4 years or longer program) ❍ Pharmacy ❍ Physical therapy and other rehabilitation/therapeutic services ❍ Public health (Including environmental health/epidemiology) ❍ OTHER health/medical sciences

GO BACK TO 4 BROAD CATEGORIES NEXT ITEM

Engineering fields

For Science, Math or Engineering Education select the primary scientific or mathematical field (click on Science), or select Social Sciences or Health/Medical and see "OTHER Social Sciences: 621: Education, General"

To view other fields (Science, Social Science, Health/Medical), please select Go back to the 4 broad categories to change your selection.

Biochemical engineering, *see Bioengineering/biomedical under OTHER Engineering*		
Chemical engineering	❍ Chemical engineering	
Civil/architectural eng.	❍ Architectural engineering	❍ Civil engineering
Electrical/computer engineering	❍ Computer/systems engineering	❍ Electrical/electronics/communications engineering
Industrial engineering	❍ Industrial/manufacturing engineering	
Mechanical engineering	❍ Mechanical engineering	
OTHER engineering	❍ Aerospace/aeronautical/ astronautical engineering ❍ Agricultural engineering ❍ Bioengineering/biomedical engineering ❍ Engineering, general ❍ Engineering sciences/ mechanics/physics ❍ Environmental engineering	❍ Geophysical/geological engineering ❍ Materials engineering, including ceramics/textiles ❍ Metallurgical engineering ❍ Mining/minerals engineering ❍ Naval architecture/marine engineering ❍ Nuclear engineering ❍ Petroleum engineering ❍ OTHER engineering

GO BACK TO 4 BROAD CATEGORIES **NEXT ITEM**

MODULE B: THE EAPSI APPLICATION PROCESS

B1. Why did you apply for an EAPSI fellowship? *Check all that apply*.

- ❑ To conduct research with a specific person or at a specific institution
- ❑ To collaborate with a foreign scientist
- ❑ To understand what research in my field was like outside the US
- ❑ To access resources (e.g. samples, equipment) for research that I could not find in the U.S.
- ❑ To enhance my skills or knowledge as a researcher
- ❑ To make progress towards earning my graduate degree
- ❑ To enhance my resume as a future job candidate
- ❑ To learn about the culture, history, and/or geography of another place
- ❑ To learn another language
- ❑ To travel outside of the United States
- ❑ For family reasons (e.g., to accompany a spouse traveling abroad)
- ❑ Other (please specify): [textbox, 300]

B2. For your application to the EAPSI program, why did you select the site you indicated was your first choice for host site? *Check all that apply.*

- ❑ The host researcher there was conducting research relevant to my own interests
- ❑ The host institution had equipment or resources helpful for my proposed research
- ❑ A faculty advisor or mentor recommended this particular site, the particular host institution or host researcher in this site
- ❑ I have professional ties with someone who is from this site
- ❑ The host researcher had visited my department or university
- ❑ There were particular places in this site (aside from the host institution) that I wanted to visit or see
- ❑ I had studied its culture, history, politics, geography, etc. before applying
- ❑ I was familiar with the primary language(s) spoken there
- ❑ Other reason (please specify): [textbox, 300]

B3. Did the notification of your application status allow you sufficient time to make the necessary arrangements for your visit or to make alternative plans if you did not receive the award? *Check one only.*

- ❑ Yes
- ❑ No
- ❑ I don't recall

B4. How did your primary graduate advisor view your decision to apply for an EAPSI? *check one only.*

- ❑ I do not know how my advisor viewed my decision to apply
- ❑ I did not have an advisor when I most recently applied
- ❑ My advisor opposed my decision to apply
- ❑ My advisor was indifferent to my decision to apply
- ❑ My advisor supported my decision to apply
- ❑ My advisor encourage me to apply to the EAPSI program

B5. What types of mentoring or guidance did you receive from your graduate advisor or other mentors during the preparation of the EAPSI application? *Check all that apply.*

- ❑ Provided a letter of recommendation to NSF
- ❑ Suggested a host institution
- ❑ Recommended me to a colleague at the host institution
- ❑ Provided feedback on my project proposal
- ❑ Discussed cultural and language aspects of the host site with me
- ❑ Other – specify: [textbox, 300]
- ❑ None

Fellows GO TO Item B6
Unfunded Applicants SKIP to Item C1

B6. Did you participate in a pre-departure orientation? *Check one only.*

- ❑ Yes
- ❑ No→**Go To C1**
- ❑ I do not recall →**Go To C1**

B6a. Did the pre-departure orientation provide adequate information on the following topics? *Check all that apply.*

- ❑ Living expenses
- ❑ Healthcare access
- ❑ Lodging
- ❑ Culture and rules of the host site
- ❑ Political situation in the host site
- ❑ What not to do in the host site
- ❑ What to do in case of emergency
- ❑ I do not recall→**Go To C1**

B6b. What additional topics do you think should have been covered during the orientation? [textbox, 500].

MODULE C: ABOUT YOU AT THE TIME OF YOUR APPLICATION
Items in this section ask for information about the year in which you applied for an EAPSI fellowship.

C1. Using a 4-point scale, what was your overall undergraduate grade point average (GPA)? *If you have more than one bachelor's degree, give your overall grade point average for your first bachelor's degree*. *Check one only.*

- ❑ 3.75 – 4.00 GPA (Mostly A's)
- ❑ 3.25 – 3.74 GPA (About half A's/half B's)
- ❑ 2.75 – 3.24 GPA (Mostly B's)
- ❑ 2.25 – 2.74 GPA (About half B's/half C's)
- ❑ 1.75 – 2.24 GPA (Mostly C's)
- ❑ 1.25 – 1.74 GPA (About half C's/half D's)
- ❑ Less than 1.25 (Mostly D's or below)
- ❑ Did not take courses where grades were given

C2a. While you were an undergraduate, did you participate in a study abroad program or did you spend a semester (or more) pursuing your education outside the United States? *Check one only.*

- ❑ Yes
- ❑ No

C2b. Before applying to EAPSI, had you participated in a study abroad program as a graduate student or spend a semester (or more) pursuing your research or graduate education outside the United States? *Check one only.*

- ❑ Yes
- ❑ No

C3. Prior to applying for an EAPSI fellowship, had you ever visited or lived in any of the following places for a period of 30 days or longer? *Check all that apply.*

- ❑ Australia
- ❑ New Zealand
- ❑ China
- ❑ Japan
- ❑ Korea
- ❑ Taiwan
- ❑ Singapore
- ❑ None of the above places

C4. At the time you applied for an EAPSI fellowship, had you studied, or were you conversant in, any of the following languages? *Check all that apply*.

- ❑ Japanese
- ❑ Korean
- ❑ Chinese (Mandarin or Cantonese)
- ❑ Malay
- ❑ Tamil
- ❑ Māori
- ❑ Hindi or Urdu
- ❑ Russian
- ❑ None of the above

C5. At the time you applied for an EAPSI fellowship, had you participated in any international or intercultural clubs, organizations, or professional associations? *Check one only.*

- ❑ Yes
- ❑ No

C6. At the time you applied for EAPSI, had you done any of the following? *Check all that apply*

- ❑ Attended elementary or secondary school in another country (outside the U.S.)
- ❑ Lived outside the U.S. for six months or longer
- ❑ Collaborated on research with someone based in another country
- ❑ Published research with someone based in another country
- ❑ Attended or presented scholarly work at a research conference in another country
- ❑ Participated on a research team with a scientist who was visiting my graduate institution from a foreign institution
- ❑ Worked with a colleague who had completed an EAPSI Fellowship
- ❑ None of the above

C7a. In your application for EAPSI, did you include a letter of support (or other written communication, such as an email message) from the host scientist with whom you proposed to work? *Check one only.*

- ❑ Yes
- ❑ No
- ❑ I do not recall

C7b. At the time you applied for EAPSI, were you already collaborating with the host scientist or someone else at the host institution to which you applied? *Check one only.*

- ❑ Yes, with my proposed host scientist
- ❑ Yes, with someone else at the host scientist's institution
- ❑ No

C7c. Which of the following were true at the time of application? *Check all that apply.*

- ❑ My graduate advisor or another faculty member in my department was collaborating or had collaborated with a researcher at the host institution
- ❑ My graduate department or university had an existing collaboration or graduate student exchange program with the host institution
- ❑ Other graduate students from my university or department had been to the host institution
- ❑ There was another type of relationship between my graduate institution and the host institution. **Please specify**: [textbox, 300] **reminder for 1st no entry in textbox entry in textbox is not required**
- ❑ None of the above were true (to my knowledge)
- ❑ I'm not sure

C8. At the time you applied for EAPSI, how many of the following had you authored/co-authored, edited/co-edited, developed/co-developed?

Include works "in press" but do not include works "under review" or "in preparation." Include works published in electronic or printed format but do not count the same work more than once if it is available in multiple formats.

Total number published/ in-press	Number completed in collaboration with a foreign colleague	
		Peer-reviewed journal articles
		Peer-reviewed conference publications (e.g. abstracts, conference papers, posters)
		Patents, registered or pending
		Book chapter(s) (e.g., in edited volumes)

C9. By the time you applied for an EAPSI Fellowship, had you received a nationally competitive fellowship(s) to support your graduate studies? *Do not include support you received directly from your graduate institution or support from a faculty member's grant funding.*

***Nationally-competitive fellowships** are unrestricted fellowships granted by a federal agency, private foundation, or similar organization directly to an individual graduate student (or graduate school applicant) for use at any graduate institution of his/her choosing. Check one only.*

- ❑ Yes
- ❑ No

MODULE D: PROFESSIONAL HISTORY

In this section, we ask about various professional experiences and accomplishments that have occurred between [EAPSI_year] and a standard "reference date." We use a standard date so that all survey participants think about the same period of time when answering these questions.

D1. As of October 1, 2010, what is the highest degree you have completed? *Check one only:*

- ❑ Bachelor's degree (BS, BA)
- ❑ Master's degree (MA, MS, MBA, etc.)
- ❑ Doctoral degree (PhD, EdD, MD, joint MD/PhD, JD, PsyD, ScD, etc.)
- ❑ Other degree– specify: [textbox, 50]

If respondent holds Doctoral Degree, then go to D1b. Else skip to D1c.

D1b. [**all respondents**]: Since receiving your first doctoral degree, how many postdoctoral appointments have you held **at institution(s) outside the United States**? Please include any postdocs you held through October 1, 2010. *Check one only.*

- ❑ 0
- ❑ 1
- ❑ 2
- ❑ 3 or more

D1c. During the week of October 1, 2010 were you working for pay or profit? Work includes being self-employed, on a postdoctoral appointment, or on any type of paid or unpaid leave, including vacation. *Check one only.*

- ❑$_1$ Yes, in a postdoctoral position → **GOTO D4**
- ❑$_2$ Yes, in another type of position (not a postdoctoral appointment) → **GOTO D2**
- ❑$_3$ No, I was still in graduate school then → **GOTO D6**
- ❑$_4$ No, I was not in graduate school and not working then → **GOTO D5**

IF D1c = 3 (I was still in graduate school) then LET "CurrGrad = 1" (see note after Item D6)

D2. Was your primary employer during the week of [October 1, 2010] an educational institution? *Check one only*

- ❑ Yes → **GOTO D2a**
- ❑ No → **GOTO D3**

D2a. Was the educational institution where you worked a . . . *Check one only*

- ❑ Preschool, elementary, middle, or secondary school or system → **GOTO D4**
- ❑ Two-year college, community college or technical institute
- ❑ Four-year college or university other than a medical school
- ❑ Medical school (including university-affiliated hospital or medical center)
- ❑ University-affiliated research institute
- ❑ Other educational institution [please specify]: [textbox, 150]

Four-year college/university includes doctoral-granting and non-doctoral-granting institutions.

D2b. During the week of October 1, 2010 what type of academic position did you hold at this institution? *Mark Yes or No for each item.*

Yes	No	
❑	❑	President, Provost, or Chancellor (any level)
❑	❑	Dean (any level), department head or chair
❑	❑	Research faculty, scientist, associate or fellow
❑	❑	Teaching faculty
❑	❑	Adjunct faculty
❑		Other (please specify: [textbox, 75])

D2c. During the week of **[**October 1, 2010], what was your faculty rank? *Check one only*

- ❑ Not applicable: no ranks designated at this institution
- ❑ Not applicable: no ranks designated for my position
- ❑ Professor/Full Professor
- ❑ Associate Professor
- ❑ Assistant Professor
- ❑ Instructor
- ❑ Lecturer
- ❑ Other: [textbox, 75]

D2d. What was your tenure status? *Check one only*

- ❑ Not applicable: no tenure system at this institution
- ❑ Not applicable: no tenure system for my position
- ❑ Tenured
- ❑ On tenure track but not tenured
- ❑ Not on tenure track

→ **Go to D4**

D3 only for respondents where D2 = NO

D3. Which of the following best describes your primary employer during the week of October 1, 2010? *Check one only.*

- ❑ SELF-EMPLOYED or a BUSINESS OWNER (non-incorporated or incorporated business, professional practice, or farm)
- ❑ PRIVATE SECTOR (for-profit or non-profit, including tax-exempt and charitable organizations; includes private colleges/universities
- ❑ Local GOVERNMENT (city, county, school district)
- ❑ State GOVERNMENT (including state colleges/universities)
- ❑ U.S. MILITARY service, activity duty or Commissioned Corps (e.g., USPHS, NOAA)
- ❑ U.S. federal GOVERNMENT
- ❑ OTHER type of employer: Please specify: [textbox, 300]

D4. In performing the primary job you held during the week of [October 1, 2010], did you work with individuals located in countries other than the US? *Check one only. If you held a postdoctoral appointment at this time, please consider that your primary job.*

- ❑ Yes → **GOTO D4a**
- ❑ No → **GOTO D5**

D4a. Did your work with individuals in countries other than the US involve . . .
Mark Yes or No for each item.

Yes	No	
❑	❑	Sharing data or information?
❑	❑	Sharing materials, equipment, or facilities?
❑	❑	Preparing a joint publication?
❑	❑	Jointly developing a product, process, or program?
❑	❑	Collaborating on a research project?
❑		Other type of work? Specify: [textbox, 300]

D4b. For the primary job you held during the week of October 1, 2010 were you employed at a location outside the U.S.? If you were based in the United States but travelled internationally for this job, you should answer "No."

- ❑ Yes
- ❑ No

D5. Between [EAPSI_year] and October 1, 2010, did you receive any grants (as Principal Investigator or co-Principal Investigator), prestigious awards or honors based on your research? *If you were an EAPSI fellow, do not count the EAPSI Fellowship itself. Check one response per row.*

Not applicable for my position (e.g., not eligible for grants/awards)	Yes	No	
❑	❑	❑	Grant(s) as Principal Investigator
❑	❑	❑	Grant(s) as co-Principal Investigator
❑	❑	❑	Prestigious award(s)/honor(s)

If any row in D5 = Yes: → Former EAPSI Fellows, GO TO D5a; Unfunded applicants, SKIP to D5b
If ALL rows in D5 = No or Not applicable → GO TO D6.

D5a. [**former EAPSI Fellows only**] Were any of these grants or awards based on research conducted or advanced during your EAPSI fellowship? *Check one only*

- ❑ Yes
- ❑ No
- ❑ Not sure

D5b. What was the name of the most prestigious grant, award or honor for research you have received and who did it come from?

(i) Name of award: [textbox, 300]

(ii) The award was from: *Check one:*

- ❑ An institution where I was employed or my graduate institution
- ❑ A US-based professional association
- ❑ An international organization
- ❑ A U.S. government agency
- ❑ A private foundation in the U.S.
- ❑ None of the above

(iii) Please type the full name of the awarding agency or organization: [textbox, 300]

D6. Between [**EAPSI_year**] and [October 1, 2010], how many of the following works had you published or produced (on your own or with others)?

Include works "in press" but do not include works "under review" or "in preparation." Include works published in electronic or printed format but do not count the same work more than once if it is available in multiple formats.

Make your best approximation if you do not know the exact number.
The first row should not appear on-screen, and the column "EAPSI Fellows only" should appear only for FELLOWS not for UNFUNDED APPLICANTS

Do not display this row on-screen	All Respondents	All respondents	EAPSI Fellows only:
	Total (if none, enter "0")	How many of these in collaboration with foreign colleague(s)?	How many of these in collaboration with your EAPSI host?
Peer-reviewed journal articles			
Peer-reviewed conference publications (e.g. abstracts, conference papers, posters)			
Patents, registered or pending			
Book chapter(s) (e.g., in edited volumes)			

AFTER ITEM D6, IF CurrGrad = 1 THEN GO TO G1; ELSE IF CurrGrad = 0 THEN GO TO D7

D7. Between [year of EAPSI] and [October 1, 2010], have you ever worked in a country other than the United States? ("Work" refers here to employment for pay or profit.) Do **not** include your EAPSI research fellowship here.

- ❑ Yes → **GOTO D7a**
- ❑ No → **GOTO D8.**

D7a. For how many years (if less than 1 year, how many months) did you work in another country (or countries)?

I worked in another country/countries for: *Check one only.*

- ❑ Less than 1 year →**Go to D7a_(i)**
- ❑ 1 year or longer → **Go to D7a_(ii)**

D7a_(i). Enter number of months total: [textbox, 2] → **Go to D8**

D7a_(ii). Enter number of years total: [textbox, 2] → **Go to D8**

D7a(i) and D7a(ii) should appear on - screen together with D7a.

D8. Between [**EAPSI_year**] and the week of [October 1, 2010], did you mentor any individuals from the United States who conducted research in another country?? C*heck all that apply*

- ❑ I mentored undergraduate students who conducted research abroad
- ❑ I mentored graduate students who conducted research abroad
- ❑ I mentored postdocs who conducted research abroad
- ❑ I mentored faculty who conducted research abroad
- ❑ I mentored research scientists who conducted research abroad
- ❑ I mentored other individuals who conducted research abroad
- ❑ I did not mentor any individuals who conducted research abroad

Former Fellows: Go to D9
Unfunded applicants: Go to D10

D9 for Former EAPSI fellows only

In this next question, we're interested in any effects that your participation in EAPSI may have had on people or institutions you've worked with in the U.S. since the end of your EAPSI fellowship.

D9. Since the end of your EAPSI fellowship, did you do any of the following? *Check one response per row*

	Yes	No	Not applicable
I have taught my colleagues, students, or peers research methods that I learned during my EAPSI fellowship	❑	❑	❑
I have shared with my colleagues resources (e.g., data, samples, materials) or tools (e.g., algorithms, software, instruments) that I collected developed during my EAPSI fellowship	❑	❑	❑

Former EAPSI fellows continue to D10

D10. Between [**EAPSI_year**] and [October 1, 2010], did you do any of the following? *Check one response per row*

	Yes	No	Not applicable
I have established a program to foster international collaborations	❑	❑	❑
I have hosted researchers or professional colleagues from another country at my institution	❑	❑	❑
I have led a delegation of colleagues to visit a research laboratory, university, or business in another country	❑	❑	❑
I have established or served in a leadership role for an international association for professionals in my line of work	❑	❑	❑

Fellows GO TO E1

Unfunded Applicants GO TO G1

MODULE E: THE EAPSI FELLOWSHIP EXPERIENCE

E1. In preparation for your EAPSI fellowship, did you study a language spoken in your host site? *Check all that apply.*

- ❑ No, I was already familiar with the language spoken in the host site
- ❑ No, I did not study a language spoken in the host site
- ❑ Yes, I did some self-guided language study (i.e., individual study using books or computer-based instructional software, such as *Rosetta Stone*)
- ❑ Yes, I studied with a conversation partner or a tutor who was familiar with a language spoken in the host site
- ❑ Yes, I enrolled in a formal language training course led by an instructor (either an online course or "live" course)

E2. During your EAPSI fellowship, did you attend or participate in any of the following types of cultural or leisure activities? *Check all that apply*

- ❑ Sightseeing
- ❑ Museums
- ❑ Festivals, holiday or religious ceremonies
- ❑ Outdoor activities to explore the landscape, geography
- ❑ Sporting events
- ❑ Non-scientific lectures or presentations
- ❑ Other (please specify):
- ❑ I did not participate in any cultural activities

E3. During your EAPSI fellowship, did you attend or participate in any of the following types of professional activities? *Check all that apply.*

- ❑ Visit(s) to educational or research institutions other than my host institution
- ❑ Visit(s) to businesses/industrial laboratories
- ❑ Language courses or language study
- ❑ Lectures, colloquia, seminars in my field
- ❑ I gave a talk or presentation to researchers in my host site
- ❑ Networking with colleagues from institutions other than my host institution
- ❑ Other (please specify):
- ❑ I did not attend or participate in any professional activities

E3a. Please describe one of the most memorable activities or events you experienced in your host site:

[textbox, 2500]

E4. Who was primarily involved in the following activities related to the EAPSI project(s) on which you worked? *Mark one answer in each row.*

	Mostly me independently	Mostly the host or members of his/her group without me	Me and the host or host's research group together about equally	Not applicable
Developing the ideas, hypotheses, broad framework, or vision for the research project	❑	❑	❑	❑
Researching literature or research base relevant to the project	❑	❑	❑	❑
Keeping records, tracking supplies, resources	❑	❑	❑	❑
Developing instrumentation, software, equipment, or data collection processes	❑	❑	❑	❑
Collecting data or carrying out simulations	❑	❑	❑	❑
Analyzing data or observations	❑	❑	❑	❑
Interpreting results	❑	❑	❑	❑
Planning or developing follow-up work based on results	❑	❑	❑	❑
Written, oral dissemination of results (publications, presentations)	❑	❑	❑	❑

E5. Did you experience any of the following difficulties during your fellowship? *Check all that apply.*

- ❑ Inadequate access to space, facilities, equipment, computers, resources/supplies
- ❑ My role on the project was less than that merited by my skills/knowledge
- ❑ Not enough guidance from host/host's research group
- ❑ I was asked to do work that was someone else's responsibility
- ❑ Not given credit for my contributions to advancing a project
- ❑ Communication or language difficulties
- ❑ Logistical difficulties (e.g., with transportation, navigating bureaucracy, etc.)
- ❑ Legal or medical difficulties in my host site
- ❑ I felt that my ideas were not treated with respect
- ❑ Encountered barriers or discomfort based on my gender
- ❑ Encountered barriers or discomfort based on my race/ethnicity
- ❑ Encountered barriers or discomfort based on my cultural or religious background
- ❑ Encountered barriers or discomfort based on a disability
- ❑ Other (please specify): [textbox, 300]
- ❑ None

E6. During your EAPSI fellowship, who provided direct supervision while you were conducting your work? *Check all that apply.*

- ❑ The host researcher him/herself
- ❑ Another staff scientist
- ❑ A junior faculty member or post-doctoral fellow
- ❑ Other graduate student(s)
- ❑ A laboratory technician or other employee/worker
- ❑ No one, I was not supervised by anyone

E7. Were any researchers from your graduate institution involved in the project(s) you conducted during EAPSI? *Check all that apply.*

- ❑ My graduate advisor
- ❑ Other faculty at my U.S. graduate institution
- ❑ Other graduate students at my U.S. graduate institution
- ❑ Undergraduate students at my U.S. graduate institution
- ❑ None of the above

E8. Please indicate how satisfied you were with various aspects of your EAPSI experience. *Check one answer in each row.*

Accommodations & Logistics	Very dissatisfied	Somewhat dissatisfied	Somewhat satisfied	Very satisfied
Lodging	❑	❑	❑	❑
Fellowship support amount	❑	❑	❑	❑
Fellowship duration	❑	❑	❑	❑
Research/laboratory facilities at the host institution	❑	❑	❑	❑
Access to the internet	❑	❑	❑	❑
Your host	**Very dissatisfied**	**Somewhat dissatisfied**	**Somewhat satisfied**	**Very satisfied**
Frequency of meetings with host	❑	❑	❑	❑
Match between host's and my research interests	❑	❑	❑	❑
Host's expertise in his/her field	❑	❑	❑	❑
The level of the host's intellectual contribution to our joint research project	❑	❑	❑	❑
Host's efforts to help me meet other researchers	❑	❑	❑	❑
Host's inclusion of me in research group/laboratory, meaningful collaboration	❑	❑	❑	❑
Guidance or mentoring provided by host	❑	❑	❑	??
Your experiences	**Very dissatisfied**	**Somewhat dissatisfied**	**Somewhat satisfied**	**Very satisfied**
Opportunities to experience and learn about culture, history, geography, etc. in my host site	❑	❑	❑	❑
The quality of research I was able to conduct	❑	❑	❑	❑
Match between scope or goals of project and duration of EAPSI	❑	❑	❑	❑
Professional connections made during the fellowship	❑	❑	❑	❑

E8a. If you would like to elaborate or comment further on areas of satisfaction or dissatisfaction with your EAPSI experience, please do so.

textbox, 2500

MODULE F: AFTER YOUR EAPSI FELLOWSHIP

F1. Since the conclusion of your EAPSI fellowship and [October 1, 2010], have you collaborated or communicated with your host scientist? *Check one only*

- ❑ I have collaborated on a research project → **GOTO F1a**
- ❑ I have communicated with my host but haven't collaborated further on research → **GOTO F1c**
- ❑ I have not communicated with my host → **GOTO F1c**

F1a. What was the extent of your collaboration? *Check all that apply*

- ❑ I have a position in the host's group
- ❑ I have a position at the host's institution
- ❑ We exchanged ideas, data, ideas, research results, or tools
- ❑ We co-authored papers
- ❑ We co-advised students
- ❑ We visited each other at our institutions
- ❑ Other – specify [textbox, 300]

F1b. How recently has the latest collaboration with your host occurred? *Check one only*

- ❑ Within the past 6 months → **GOTO F2**
- ❑ Within the past 12 months → **GOTO F2**
- ❑ 1-2 years ago → **GOTO F2**
- ❑ 3 or more years ago → **GOTO F2**

F1c. Why do you no longer collaborate with your former host? *Check all that apply*

- ❑ Our research interests diverged
- ❑ One or both of us lacked funding needed to maintain collaboration
- ❑ Language differences have hindered further collaboration
- ❑ Political or cultural differences have hindered further collaboration
- ❑ Geographic distance has hindered further collaboration
- ❑ I did not think that further collaboration would be beneficial for me
- ❑ My host did not actively pursue or maintain further collaboration with me
- ❑ My colleagues discouraged me from continuing this collaboration
- ❑ My advisor discouraged me from continuing this collaboration
- ❑ One (or both) of us is too busy with other projects
- ❑ Other – specify [textbox, 300]

F2. Did participating in EAPSI make you qualified for a broader range of opportunities after the fellowship ended? *Check one only.*

- ❑ Yes, EAPSI did broaden my opportunities→ **GOTO F2a**
- ❑ No, EAPSI did not broaden my opportunities → **GOTO F2b**
- ❑ I am not sure → **GOTOF3**

F2a. Describe how EAPSI broadened your opportunities:

[textbox, 2500]

F2b. Did EAPSI constrain your opportunities? *Check one only.*

- ❑ Yes → Go to F2c
- ❑ No → Go to F3

F2c. Describe how EAPSI constrained your opportunities:

textbox, 2500

F3. Which of the following professional benefits occurred as a result of your participation in EAPSI? *Check all that apply*

- ❑ My work at the host institution resulted in a substantial advancement in my research
- ❑ My work at the host institution opened up new areas of investigation
- ❑ I became familiar with the scientific enterprise in my EAPSI site
- ❑ I became committed to international research collaboration
- ❑ I made valuable connections to researchers outside the U.S.
- ❑ My career goals changed from an academic career to a non-academic career
- ❑ My career goals changed from a non-academic to an academic career
- ❑ I decided to pursue a graduate degree in a different discipline than the one I was pursuing when I began my EAPSI fellowship
- ❑ EAPSI participation made me more competitive for jobs I was interested in
- ❑ EAPSI participation made me consider professional opportunities I would not have considered in the past
- ❑ None of the above

F4. Which of the following additional benefits occurred as a result of your participation in EAPSI? *Check all that apply*

- ❑ Research methods or ideas that I learned benefited others in my institution
- ❑ Samples that I collected or tools that I developed benefited others in my institution
- ❑ My peers became interested in international collaboration
- ❑ Others in my research group (in the U.S.) began an international research collaboration
- ❑ Researchers that I met during my fellowship joined my research group
- ❑ Other – specify [textbox]
- ❑ None of the above

F5. Which of the following personal benefits occurred as a result of your participation? *Check all that apply.*

- ❑ I became comfortable with the traditions and culture of my host site
- ❑ I made personal connections in the places I visited during the fellowship
- ❑ I gained proficiency in another language
- ❑ I decided to live outside the United States (i.e. at least 6 months)
- ❑ None of the above

F6. Which of the following are true? *Check Yes or No for each:*

Yes	No	
❑	❑	Completion of my graduate degree was delayed because of my participation in EAPSI
❑	❑	Competition was introduced between my research group and the host because of my participation in EAPSI
❑	❑	I lost an important career or educational opportunity by participating in EAPSI
❑	❑	I am more skeptical about international collaboration than before EAPSI

F7. What was the most positive aspect of your EAPSI experience? [textbox, 2500]

F8. What was the most challenging aspect of your EAPSI experience? [textbox, 2500]

F9. Would you recommend the EAPSI fellowship to another graduate student seeking an international experience? *Check one only.*

- ❑ Yes
- ❑ No

F9a. Why or why not? [textbox, 2500] **F9a should appear on same screen as Item F9**

F10. Would you recommend your EAPSI host scientist to another graduate student seeking an international experience? *Check one only.*

- ❑ Yes
- ❑ No

F11. Your fellowship took place in [**EAPSI_actual_site**]. Would you recommend this EAPSI site to another graduate student seeking an international experience? *Check one only.*

- ❑ Yes
- ❑ No

F12. What would you change about the program? [textbox, 2500]

F13. What was the most important contribution of EAPSI participation to your career? [textbox, 2500]

MODULE G: DEMOGRAPHIC INFORMATION

G1. What is your gender?

- ❑ Male
- ❑ Female

G2. What is your ethnicity? *Check one only.*

- ❑ Hispanic or Latino
- ❑ Not Hispanic or Latino

G3. What is your race? *Check one or more.*

- ❑ American Indian or Alaska native
- ❑ Asian
- ❑ Black or African American
- ❑ Native Hawaiian or other Pacific Islander
- ❑ White

G4. What is your citizenship status? *Check one only*.

- ❑ United States citizen since birth → Go to G5
- ❑ United States citizen, naturalized → Go to G4a
- ❑ Non-U.S. citizen with a permanent U.S. Resident Visa ("Green Card") → Go to G4a
- ❑ Non-U.S. citizen with a temporary U.S. Visa → Go to G4a

G4a. How old were you when you began living in the United States? (Enter age in years): [textbox, 2]

The next question is designed to help us better understand the career paths of individuals with different physical disabilities.

G5. What is the USUAL degree of difficulty you have with: *Mark one answer for each item.*		None	Slight	Moderate	Severe	Unable to do
1	SEEING words or letters in ordinary newsprint (with glasses/contact lenses, if you usually wear them)	❑1	❑2	❑3	❑4	❑5
2	HEARING what is normally said in conversation with another person (with hearing aid, if you usually wear one)	❑1	❑2	❑3	❑4	❑5
3	WALKING without human or mechanical assistance or using stairs	❑1	❑2	❑3	❑4	❑5
4	LIFTING or carrying something as heavy as 10 pounds, such as a bag of groceries	❑1	❑2	❑3	❑4	❑5

If all 4 rows in G5 are marked "None," Go to Thank you screen. Else display Item G5a underneath Item G5.

G5a. What is the earliest age at which you first began experiencing any difficulties in any of these areas?

❑ Since birth; or Enter age in years: __|____

Programmer note: age in years valid range = 0 to 99

SUBMIT SURVEY

Thank you screen: After hitting SUBMIT, respondent sees this screen.

EAPSI applicant survey

Conclusion

Thank you for completing this survey. If you have any general comments about the survey, please write them below.

Textbox, 2500

If you have any questions about this survey or the study, please contact Dr. Alina Martinez, Study Director, Abt Associates, at (866) 421-6223 (toll-free within the US) or email her at EAPSI_survey@abtassoc.com. You may also contact John Tsapogas, who is overseeing this study at NSF, with any questions or comments: jtsapoga@nsf.gov.

Thank you for your assistance. We greatly appreciate your time and consideration.

CONFIRM FELLOWSHIP SCREEN, SECTION R

NSF's records may be in error. However, before continuing, we'd like to note that some summer institutes that are part of the East Asia and Pacific Summer Institutes (EAPSI) program are also known by different names. For example, all of the following summer institutes are part of the EAPSI program:

- The **Summer Program in Japan**, a joint program of the Japan Society for the Promotion of Science (JSPS) and NSF;
- The **Korea Summer Institute**, a joint program of the Korea Science and Engineering Foundation (KOSEF) and NSF;
- The **Summer Institute in Taiwan** (SIT), a joint program of Taiwan's National Science Council (NSC) and NSF;
- The **EAPSI summer program in Australia**, supported by the Australian Academy of Science and NSF;
- The **China Summer Institute**, supported by NSF and the Chinese Ministry of Science and Technology (MOST), the Chinese Academy of Sciences (CAS), and National Natural Science Foundation of China (NSFC).
- The **EAPSI summer program in New Zealand**, coordinated by the Royal Society of New Zealand and supported by the New Zealand Ministry of Research, Science and Technology (MoRST) and NSF;
- The **EAPSI summer program in Singapore**, co-sponsored by Singapore's National Research Foundation and NSF.

If AWDSTATUS = 1 than display K1
If AWDSTATUS = 2 then display K2

Programmer note: the above list of programs must appear on same webpage/screen as K1

K1. If you participated in any of the above, these are each part of the EAPSI program.

Did you participate in any of the above?

- ❑ Yes, I did → if respondent came here via Intro screen, return to that intro screen. If respondent came here from A2.1 go to A2.3a below
- ❑ No, I applied but I did not participate in the EAPSI program → **Go TO S2**
- ❑ No, I did not participate; nor did I ever applied to any of the above programs→ Go TO EXIT SCREEN
- ❑ I'm not sure → Go TO EXIT SCREEN

A2.3a Did you participate in this EAPSI program in [EAPSI_Year]? *If you participated in an EAPSI program more than once, we are asking about your most recent EAPSI fellowship*

- ❑ Yes
- ❑ No, it began in (Enter four-digit year): [yyyy] Set EAPSI_Year = entry and FLAG EAPSI_YEAR_CHANGE = 1

AFTER A2.3a, GO TO A3

Programmer note: the above list of programs must appear on same webpage/screen as K2. Also note that the ONLY way a respondent arrives at K2 is via the intro screen (not via A2.2 – A2.2 directs the respondent to Section S).

K2. If you submitted an application for any of the above, these are each part of the EAPSI program.

Did you apply for any of the above?

- ❑ Yes, I did → Return to intro screen.
- ❑ No, I did not → Go TO EXIT SCREEN
- ❑ I'm not sure → Go TO EXIT SCREEN

SECTION S

For this study, we are seeking former EAPSI applicants who prepared and submitted an individual research proposal and application to the National Science Foundation for its EAPSI program. Some students may have applied to the EAPSI program but travelled to Australia, China, Japan, Korea, New Zealand, Taiwan, or Singapore under the sponsorship of a U.S. faculty member who accompanied students as part of a different NSF-funded program.

Did your summer research program in Australia, China, Japan, Korea, New Zealand, Taiwan, or Singapore result from an application that you prepared and submitted to NSF, or did you go to one of these places under a U.S. faculty member's sponsorship?

- ❑ My EAPSI summer research fellowship was the result of an application I prepared and submitted → **go to S1**
- ❑ I submitted an application myself, but the international summer research program in which I participated was under the sponsorship of a U.S. faculty member who accompanied students abroad → **go to EXIT SCREEN**
- ❑ I'm not sure → **go to EXIT SCREEN**

S1: Please accept our apology for the mistake in our records. W**e especially need you to complete this survey.** This survey focuses on your international experiences, professional achievements, the type of work you do currently and the types of collaborations you may have with scientists and engineers in the US and other countries. **If you would please continue, we have updated your status as a former EAPSI summer research fellow.** You indicated that you participated in EAPSI in [EAPSI_year] in [EAPSI_actual_site]. **SET AWDSTATUS = 1, SET FLAG_AWDSTATUS_CHANGE =1 and Go to A3 when respondent clicks on Continue**

CONTINUE Go to A3

S2: Please accept our apology for the mistake in our records. W**e especially need you to complete this survey.** This survey focuses on your professional achievements, the type of work you do currently and the types of collaborations you may have with scientists and engineers in the US and other countries. **The value of this study depends on the participation of individuals who applied for one of the above EAPSI programs, even if you did not participate. Please click here to continue with to the survey. CONTINUE**

SET AWDSTATUS = 2 AND GOTO Item A2.3b. FLAG RESPONDENT AS 'FLAG_AWDSTATUS_CHANGE=1' for our analysis purposes.

A2.3b Did you apply for a [**EAPSI_ Year**] EAPSI summer research fellowship?

- ❑ Yes
- ❑ No, I applied for a different year (Enter four-digit year): [yyyy] Set EAPSI_ Year = entered text and FLAG EAPSI_YEAR_CHANGE = 1

AFTER A2.3b, GO TO A3

EXIT SCREEN screen:
If we have identified the wrong respondent or have erroneous information, display this screen and FLAG this respondent for Abt follow-up (weekly basis):

EAPSI applicant survey

Please accept our apology.
The information you supplied suggests that you are not eligible to participate in this study **or** that we have reached you in error. We regret any inconvenience to you. If you have any questions about this study or you would like to make a comment, please contact one of the following individuals:

- Dr. Alina Martinez, Study Director at Abt Associates: EAPSI_survey@abtassoc.com, or (866) 421-6223 (toll free within the U.S.);
- John Tsapogas, Office of International Science and Engineering, NSF: jtsapoga@nsf.gov.

May we have permission to contact you by telephone to clarify your responses here? Entering your number does not obligate you to answer any questions.

- ❑ Yes, you may reach me at _ _ _ _ _ _ _ _ _ _ _ _ . [telephone digit entry] **Go to Best Times.**
- ❑ No, please do not contact me.

Best time(s) to call (*check all that apply*):

- ❑ Weekdays (9 to 5pm)
- ❑ Evenings (5 to 8pm)
- ❑ Saturday or Sunday 9-5pm

DO NOT REQUIRE RESPONSES ON THIS EXIT SCREEN. NO REMINDER ON THIS SCREEN IF IT IS LEFT BLANK.
Exit screen must have a PREVIOUS ITEM button to allow for a respondent who accidentally marked a response not intended.

DEFAULTS for SKIP PATTERNS IF NO RESPONSE
REMINDERS FIRST TIME NO RESPONSE

- No items require a response.
- No items require a reminder to enter an answer/select a response unless indicated below. If a reminder is needed for the first time user leaves an item blank, re-display the item with the text below shown on-screen in **bold, red text.**

DEFAULTS for SKIP PATTERNS

Module A: If A1, A2.1/A2.2, and/or A4a. are blank, no reminder needed but use the default below for skip patterns:

A1. Based on the information that you provided to NSF in your application, your name is [First Name, Middle Name/initial, Last Name]. Is this correct?

❑ Yes, this is correct. →

FELLOWS	**GOTO A2.1**
UNFUNDED APPLICANTS	**GOTO A2.2**

[**Former Fellows only**]:

A2.1 Based on the information contained in the NSF EAPSI database, you participated in the National Science Foundation's East Asia and Pacific Summer Institutes program (EAPSI) in the summer of [**EAPSI_year**]. Is this correct?

If you participated in EAPSI more than once, we refer here, and throughout the rest of the survey, to your most recent EAPSI experience unless specifically stated otherwise.

❑ Yes, this is correct. → **GOTO A3**

[**Unfunded applicants only**]

A2.2. Based on the information contained in the NSF database, you most recently applied for EAPSI in [**year**], but did not participate in a fellowship. Is this correct?

❑ Yes, this is correct. → **GOTO A3**

A4. Based on the information that you provided to NSF in your application, you were enrolled at [University] when you most recently applied for an EAPSI fellowship. Is this correct?

❑ Yes

A5a. As of [October 1st, 2010], had you earned this degree?

❑ Yes → Go to A5b

REMINDERS to DISPLAY on FIRST NO RESPONSE

A3. Based on the information contained in the NSF database, when you most recently applied for an EAPSI fellowship, the first choice of host site you listed was [**EAPSI_app_site**]. (If you received an EAPSI fellowship, you may have visited a different site, but here we want to know what site you listed in your application as your first choice.)

Is this correct?

Please select a response before continuing to the next item. [it is ok if this item is still left blank]

A3a. Some EAPSI fellows did not receive their first choice of host site. In which site was your EAPSI fellowship?
No response selected. If you do not recall, you may leave this item blank and go to the next item.

A5. What graduate degree were you pursuing when you most recently applied for the summer EAPSI fellowship?
No response selected. If you do not recall, you may leave this item blank and go to the next item.

A5a. As of [October 1st, 2010], had you earned this degree?
No response selected. If you do not recall, you may leave this item blank and go to the next item.

A7. What discipline were you studying as a graduate student when you applied for an EAPSI fellowship? Please select the field that best matches your discipline. First, indicate which one of four broader areas in which your discipline falls: *Check one only:*
Please select a response before continuing to the next item. [it is ok if this item is still left blank]

- ❑1 Sciences
  (e.g., Biological/Life, Chemical, Computer/Information, Environmental, Earth/Atmospheric/Oceanographic, Geosciences, Mathematical/Statistical, Physics, Psychology)
- ❑2 Social Sciences
  (e.g., Economics, Sociology, Anthropology/Archaeology, Political Science, Geography, Linguistics, other)
- ❑3 Health/Medical fields
- ❑4 Engineering

[and it's also ok if no 3-digit code is selected within "Sciences" or "Social Sciences" or "Health/Medical" or "Engineering" -- no reminder needed]

C1. Using a 4-point scale, what was your overall undergraduate grade point average (GPA)?
If you have more than one bachelor's degree, give your overall grade point average for your first bachelor's degree. Check one only.
No response selected. If you're not sure or do not recall, please make your best estimate. [it is ok if this item is still left blank]

D1. As of October 1, 2010, what is the highest degree you have completed? *Check one only:*
Please select a response before continuing to the next item. [it is ok if this item is still left blank]

D1c. During the week of October 1, 2010 were you working for pay or profit? Work includes being self-employed, on a postdoctoral appointment, or on any type of paid or unpaid leave, including vacation. *Check one only.*
Please select a response before continuing to the next item. [it is ok if this item is still left blank] default = Yes, in another type of position (not a postdoc)

D2. Was your primary employer during the week of [October 1, 2010] an educational institution? *Check one only*
No response selected. If you did not mean to leave this item blank, please check one: [if left blank, default is "yes" and go to D2a]

D4. In performing the primary job you held during the week of [October 1, 2010], did you work with individuals located in countries other than the US? *Check one only. If you held a postdoctoral appointment at this time, please consider that your primary job.*
No response selected. If you did not mean to leave this item blank, please check one: [if left blank, default is "no" and go to D5]

D7. Between [year of EAPSI] and [October 1, 2010], have you ever worked in a country other than the United States? ("Work" refers here to employment for pay or profit.)
No response selected. If you did not mean to leave this item blank, please check one: [if left blank, default is "no" and go to D8]

- ❑ Yes → **GOTO D7a**
- ❑ No → **GOTO D8.**

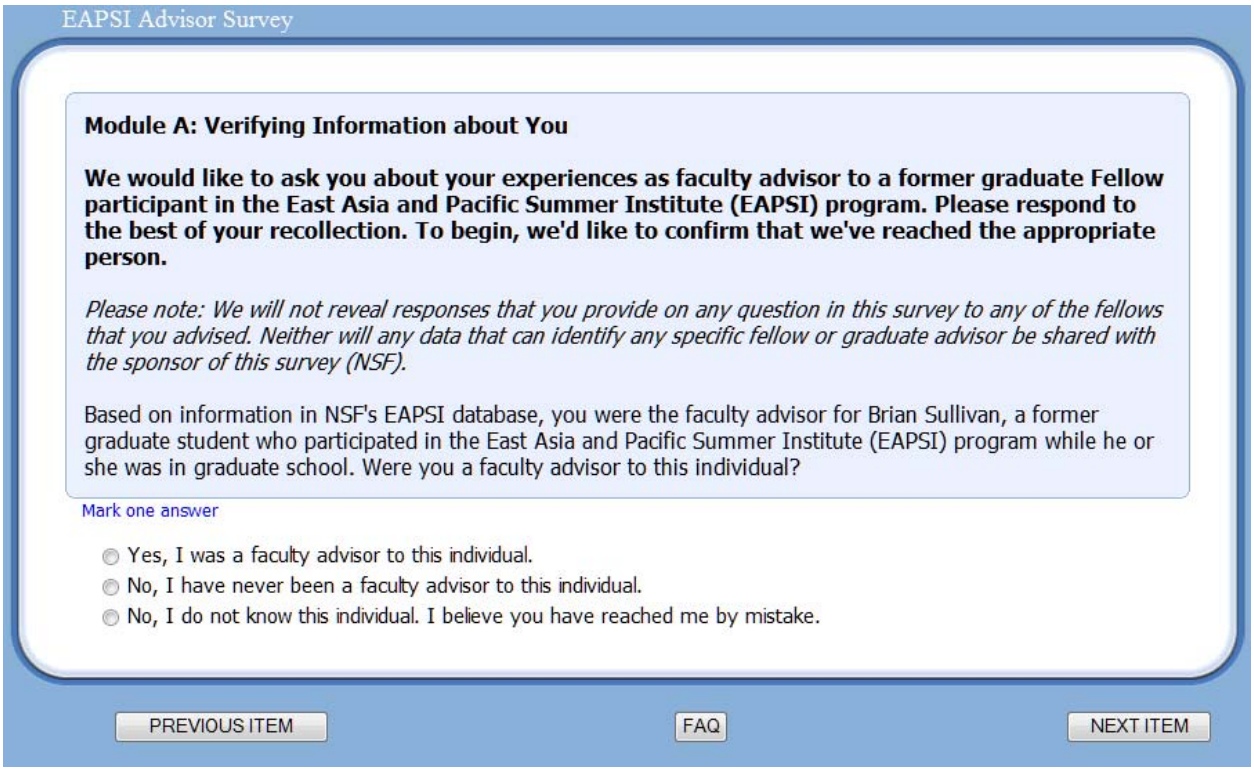
Survey of Graduate Advisors of former East Asia and Pacific Summer Institute (EAPSI) Fellows for the National Science Foundation

Programming notes (were not displayed in the actual survey) appear in red or brown text throughout. Hyperlinked text appeared embossed and underlined in this document but were not formatted this way onscreen unless noted. FAQs opened in a popup window.

General guidelines:

Each screen displayed one question at a time unless otherwise indicated.

Each screen displayed a standard set of Navigation buttons shown below.



Some items contained placeholders for fields that were programmed to be auto-filled from the sample file for each respondent. These fields are enclosed in [brackets] and printed in brown. Textboxes for open-text responses are indicated with [textbox, 150] where the number indicates the length of the field (how many characters the respondent may type)

Sample variables:

EAPSI_appSite: Name of the country or site that FELLOW NAME APPLIED TO.

EAPSI_actualSite: Site where FELLOW NAME ACTUALLY PARTICIPATED --not really a sample variable, will be updated by advisor during survey (see Item A5 below)

EAPSI_Dropdown Menu:
Values:

- [blank]
- Australia
- China
- Korea
- Japan
- New Zealand
- Singapore
- Taiwan

EAPSI_YEAR: the year that the respondent hosted the EAPSI fellow named in the survey.
Values: 2000, 2001, 2002, 2003 2004, 2005, 2006, 2007, 2008, or 2009

Host institution: the name of the university, research center, company where the host worked when EAPSI fellow visited.

Grad_institution: the name of the U.S. graduate university where the Fellow was enrolled at the time of EAPSI

Fellow Name: name of individual EAPSI fellow

Survey of Graduate Advisors of former East Asia and Pacific Summer Institute (EAPSI) Fellows for the National Science Foundation

Welcome and thank for your interest in this study. This survey is being conducted by Abt Associates Inc. and our subsidiary, AbtSRBI, for the National Science Foundation (NSF) to learn about the perspective of advisors to graduate student participants in NSF's East Asia and Pacific Summer Institute (EAPSI) program. This survey will give NSF information about the professional characteristics and international collaborations of U.S. scientists and engineers and help NSF improve programs intended to foster a globally engaged scientific and engineering workforce. You are receiving this survey because you are listed in the EAPSI database as the faculty advisor of a graduate student who was an EAPSI fellow. We estimate that it will take approximately 15 minutes to complete the survey.

Confidentiality and Participation

Participation in the survey is voluntary and nonparticipation will have no impact on you or your institution. You may skip questions on the survey or discontinue participation at any time. There are minimal risks associated with your participation. We take your privacy very seriously. Your responses to this survey will be protected under the Privacy Act. There is minimal risk of breach of confidentiality, and we have put in place procedures to minimize this risk. Reports will never identify you by name, and information from the study will only be reported in the aggregate at the program level, combined with about approximately 500 other responses. We will not reveal responses that you provide on any question in this survey to any of the fellows that you advised. Neither will any data that can identify any specific fellow or graduate advisor be shared with the sponsor of this survey (NSF). When we receive your survey we will detach and store separately your name and other identifying information that could be used to link you to your survey responses. Survey responses will be stored on a secure drive that is only accessible to members on the study team. Only study team web technicians and data analysts from Abt Associates and AbtSRBI will see individual responses that can be linked to you. Survey data files will be shared with NSF at the end of the study, only after study team members have examined the data to be free of any information that could help identify you; this cleaning includes procedures to prevent someone from inferring your identity by analyzing non-identifying data. Hence, we encourage you to respond candidly about your experiences. Separate from your individual responses to the survey we will provide NSF any updated contact information we have found or requested from you. None of this contact information will be linked in any way to your survey responses. At the conclusion of the study, Abt Associates and AbtSRBI will destroy all records, electronic or otherwise, that link you to your survey responses.

Questions

If you have questions about the study, please contact the study director, Alina Martinez of Abt Associates Inc. at (866) 421-6223 (toll free within the U.S.) or email her at EAPSI_survey@abtassoc.com. You may also contact the evaluation's program officer at NSF, John Tsapogas (jtsapoga@nsf.gov). If you have questions about your rights as a research participant, you may contact Teresa Doksum, the Abt Institutional Review Board Administrator at (877) 520-6835 (toll free within the U.S.) or by email: irb@abtassoc.com. To learn more about this study, please refer to the **Frequently Asked Questions** page.

Consent

Please click BEGIN if you agree to participate in this study. BEGIN

This study's IRB approval number is #0494, valid from 8/6/2010 to 8/5/2011. For questions, please contact Teresa Doksum, IRB Administrator, Abt Associates, at IRB@abtassoc.com. The valid OMB control no. for this information collection is 3145-0214 (Expires on 12/31/13)

Navigating through the survey:
As you work through the survey, your responses are automatically saved. You may change a response by clicking on the **PREVIOUS ITEM** button. Use the **NEXT ITEM** button to advance to the next question. At any time, you may close the survey and resume where you left off at a later time. On each page of the survey, an **FAQs** button is provided if you have a question during the survey or need information about how to contact the survey administrator.

When you have completed the survey, please click on the **SUBMIT** button at the end of the survey. You may submit the survey even if there are some questions that you choose not to answer.

CONTINUE

FREQUENTLY ASKED QUESTIONS

What is the East Asia and Pacific Summer Institute (EAPSI) Program?

The East Asia and Pacific Summer Institute (EAPSI) Program is a National Science Foundation (NSF) program that provides funding for U.S. graduate students to spend eight to ten weeks collaborating with a host researcher in one of seven locations in the East Asia and Pacific region: Australia, China, Japan, Korea, New Zealand, Singapore, and Taiwan.

Why are you doing this study?

NSF is interested in learning about the characteristics of current and former graduate students who participated in the EAPSI program between 1999 and 2009. NSF is particularly interested in how the graduate advisors of EAPSI Fellows' view the program and its benefits (or costs) to graduate students' subsequent educational and career paths. This information will help NSF understand the usefulness and relevance of international research training for scientists and engineers.

Why have I been selected to participate in this survey?

You have been selected to participate because we have identified you as having served as graduate advisor to a former EAPSI fellow.

How did you get my contact information?

We identified you from records maintained by the National Science Foundation on prior EAPSI Fellows' applications. We then obtained your contact information through an internet search.

How long will this survey take to complete?

We estimate that the survey will take about 15 minutes.

How will you use my comments?

Responses from all survey respondents will be used to answer questions about the graduate training, international experiences, and career paths of former EAPSI Fellows. We will not reveal responses that you provide on any question in this survey to any of the fellows that you advised. Neither will any data that can identify any specific fellow or graduate advisor be shared with the sponsor of this survey (NSF).

What happens if I don't answer this survey?
Participation in the survey is voluntary and nonparticipation will have no impact on you or your institution. Study participation will not affect your current NSF funding or future applications to NSF for funding/grants.

Has this study received human subjects review clearance?
Yes, the study was approved by Abt Associates' Institutional Review Board. If you have any concerns about your participation in this survey, please contact Teresa Doksum, Institutional Review Board Administrator at Abt Associates, at (877) 520-6835 or via email at irb@abtassoc.com.

Who is funding the study?
The study has been funded by the National Science Foundation under contract GS-10F-0086K. Abt Associates and AbtSRBI will complete the study.

Who are Abt Associates Inc and AbtSRBI?
Abt Associates is an independent research firm headquartered in Cambridge, Massachusetts. AbtSRBI is a wholly-owned subsidiary of Abt Associates specializing in large-scale data collection and public opinion research. NSF has contracted with Abt Associates and AbtSRBI to design and implement a survey of the graduate advisors of former participants in NSF's EAPSI program.

EAPSI Study: Graduate Advisor Survey

Module A: Verifying Information about You

We would like to ask you about your experiences as faculty advisor to a former graduate Fellow participant in the East Asia and Pacific Summer Institute (EAPSI) program. Please respond to the best of your recollection. To begin, we'd like to confirm that we've reached the appropriate person.

Please note: We will not reveal responses that you provide on any question in this survey to any of the fellows that you advised. Neither will any data that can identify any specific fellow or graduate advisor be shared with the sponsor of this survey (NSF).

A1a. Based on information in NSF's EAPSI database, you were the faculty advisor for [Fellow name], a former graduate student who participated in the East Asia and Pacific Summer Institute (EAPSI) program while he or she was in graduate school. Were you a faculty advisor to this individual? *Mark one answer*

- ❑ Yes, I was a faculty advisor to this individual.
- ❑ No, I have never been a faculty advisor to this individual. EXIT SURVEY.
- ❑ No, I do not know this individual. I believe you have reached me by mistake. EXIT SURVEY

A1b. Based on the information NSF's EAPSI database, your name is [First Name, Middle Name/Initial, Last Name]. Is this information correct? *Mark one answer*

- ❑ Yes.
- ❑ No, my name has changed or is misspelled above. My name is: [Textbox, 75]
- ❑ No, I am not the person named above. I believe you have reached me by mistake. EXIT SURVEY

If Grad_institution = <missing> then GO TO A2
Else If Grad_institution = <not missing> then GO TO A2a.

A2. At what graduate institution were you a faculty member in [EAPSI_YEAR] when you served as this student's graduate advisor? *Please type in the full name of the university without abbreviations. If the university has more than one campus, please indicate the specific campus (e.g., University of California, Los Angeles*)

Name of graduate institution: [textbox, 300] Set Grad_Institution = text entered here and GOTO A2a

A2a. As of October 1, 2010, were you at [Grad_Institution]? *Mark one answer*

- ❑$_1$ Yes
- ❑$_2$ No, I was at a different institution on October 1, 2010

A3. What was your faculty rank (or other title) at the time you were a graduate advisor to [Fellow Name] (i.e., in [EAPSI_Year])? *Check all that apply*

- ❑ Professor Emeritus/a
- ❑ Professor/Full Professor/Named Professor/Distinguished Professor
- ❑ Associate Professor
- ❑ Assistant Professor
- ❑ Adjunct Professor
- ❑ Visiting Professor
- ❑ Department Chairperson
- ❑ Graduate Program Chairperson
- ❑ Dean (any level)
- ❑ Other rank or title (Please specify): [textbox, 150]

A4. What is your current title/current titles?

- ❑ Unchanged since [EAPSI_Year]

Changed: My current title is/titles are: *Check all that apply*

- ❑ Professor Emeritus/a
- ❑ Professor/Full Professor/Named Professor/Distinguished Professor
- ❑ Associate Professor
- ❑ Assistant Professor
- ❑ Adjunct Professor
- ❑ Visiting Professor
- ❑ Department Chairperson
- ❑ Graduate Program Chairperson
- ❑ Dean (any level)
- ❑ Other rank or title (Please specify): [textbox, 150]

A5. Did your former graduate student ([Fellow Name]) participate in EAPSI in [EAPSI_appSite] or in another of the EAPSI sites? *Mark one answer*

- ❑ Yes, this student participated in EAPSI in [EAPSI_appSite] Set EAPSI_actualSite = EAPSI_appSite
- ❑ No, I believe this student participated in EAPSI in [EAPSI site dropdown menu] Set EAPSI_actualSite = selected value from menu unless selection is [blank]. If selection is blank PRESENT REMINDER: "**Please click on the menu to select a location**." If still [blank] then Set EAPSI_actualSite = EAPSI_appSite
- ❑ I do not recall, or I am not sure. Set EAPSI_actualSite = EAPSI_appSite

Module B: Your role in EAPSI Fellow's application to the program

NSF's EAPSI program records indicate that [Fellow Name] participated in the EAPSI program during the summer of [EAPSI_YEAR]. Items on the rest of this survey ask about your involvement with the Fellow, the Fellow's EAPSI experience and your perceptions of the EAPSI program. Please answer to the best of your recollection.

B1. Before your student [Fellow Name] applied for an EAPSI fellowship, how familiar were you with the EAPSI program? *Mark one answer*

- ❑ Very familiar → GO TO B2
- ❑ Somewhat familiar → GO TO B1a
- ❑ Not very familiar → GO TO B1a
- ❑ I had never heard of` it → GO TO B1a
- ❑ I cannot recall → GO TO B1a

B1a. Were you familiar any of the following programs? These programs were alternative names for the EAPSI institutes in earlier years. *Check all that apply.*

- ❑ The Summer Program in Japan
- ❑ The Korea Summer Institute
- ❑ The Summer Institute in Taiwan
- ❑ The Summer Institute in China
- ❑ The EAPSI program in Australia
- ❑ The EAPSI program in New Zealand
- ❑ The EAPSI program in Singapore
- ❑ None of the above

B2. In [EAPSI_YEAR], did your institution do any of the following to publicize the EAPSI program to graduate students? *Check one response in each row*

	YES	NO	DO NOT RECALL
Provided application information about EAPSI in departmental newsletters, emails, listservs	❑	❑	❑
Posted EAPSI information on departmental bulletin boards	❑	❑	❑
Maintained current EAPSI program information at the student research/internship/ or career center	❑	❑	❑
Held on-campus meetings about EAPSI	❑	❑	❑
Former EAPSI fellows presented their EAPSI experiences to other graduate students	❑	❑	❑
Actively encouraged individual graduate students to apply for the EAPSI program	❑	❑	❑
Other. Please specify: [Textbox, 300]	❑		

B3. In [EAPSI_YEAR], what types of support did you (or your department or institution) provide to graduate students for the EAPSI application process? *Check one response in each row*

Assistance with:	**YES**	**NO**	**DO NOT RECALL**
Locating an appropriate host institution or host researcher in an EAPSI site	❑	❑	❑
Contacting the host institution	❑	❑	❑
Application preparation	❑	❑	❑
Letter(s) of recommendation to host researcher in EAPSI site	❑	❑	❑
Letter(s) of recommendation to NSF	❑	❑	❑
Other. Please specify: [Textbox, 300]	❑		

B4. Before your graduate student, [Fellow Name], applied to participate in the EAPSI program, were any of the following true? *Check all that apply*

- ❑ [1] I had been an EAPSI fellow → GO TO B4a if this response checked regardless of other responses that may/may not be checked
- ❑ [2] I had been a graduate student, postdoc, faculty member, or visiting scientist in the foreign institution which hosted the Fellow → GO TO B5 unless response option 1 also checked
- ❑ [3] I had a collaboration with the faculty member (or researcher) who hosted my graduate student advisee→ GO TO B5 unless response option 1 also checked
- ❑ [4] I had a collaboration with another faculty member (or researcher) at the institution which hosted my graduate student advisee→ GO TO B5 unless response option 1 also checked
- ❑ [5] I had been a graduate student, a postdoc, a faculty member, or a visiting scientist in [EAPSI_appSite] → GO TO B5 unless response option 1 also checked
- ❑ [6] I had another connection to [EAPSI_appsite]. Please specify: [Textbox, 500] → GO TO B5 unless response option 1 also checked
- ❑ [7] I had been a graduate student, postdoc, faculty member, or visiting scientist in a country other than the United States → GO TO B5 unless response option 1 also checked
- ❑ None of the above

B4a. Were you an EAPSI fellow in [EAPSI_appSite]? *Mark one answer*

- ❑ Yes
- ❑ No, I was an EAPSI fellow in [EAPSI dropdown menu] set AdvisorSite = selection.

B5. Did you encourage [FELLOW NAME] to apply to the EAPSI program? *Mark one answer*

- ❑ Yes [GO TO B6]
- ❑ No [GO TO C1]

B6. What were the reasons you encouraged this Fellow to apply to the EAPSI program? *Check all that apply*

- ❑ My own positive experiences collaborating internationally
- ❑ The importance of gaining an international perspective
- ❑ To help the Fellow's future academic or professional career
- ❑ To foster more US – international collaborations among researchers
- ❑ Other. Please specify: [Textbox, 1000]

Module C: Your former student's participation in the EAPSI program

C1. While the Fellow was overseas at the host institution, did you provide any of the following ongoing support? *Check all that apply*

- ❑ I provided academic support (research planning, interpretation) to the Fellow
- ❑ I provided logistical, cultural or language support to the Fellow
- ❑ I helped facilitate collaboration between the Fellow and the host scientist (or the host scientist's research group)
- ❑ I worked with the applicant to develop a publication based on research conducted at the host institution
- ❑ I visited the Fellow at the host institution
- ❑ Other support: [Textbox, 1000]
- ❑ None of the above

C2. In your view, how successful was the program in helping this Fellow to achieve the following? *Check one response for each row*

	Highly unsuccessful	**Somewhat Unsuccessful**	**Somewhat Successful**	**Highly successful**	**I cannot recall or I do not know**
To establish a collaboration with a researcher(s) outside the U.S.	❑	❑	❑	❑	❑
To foster a long-lasting international collaboration	❑	❑	❑	❑	❑
To advance his/her research agenda	❑	❑	❑	❑	❑
To gain exposure to another country's research enterprise	❑	❑	❑	❑	❑
To learn a technique or an approach from the host scientist	❑	❑	❑	❑	❑
To gain access to resources or materials not widely available in the U.S.	❑	❑	❑	❑	❑
To become familiar with the culture and traditions of another country	❑	❑	❑	❑	❑

C2a. Did the program help the Fellow develop other skills or insights not listed above? [textbox, 2500]

Module D: Benefits and challenges of Participation

D1. Upon the Fellow's return to the U.S., which of the following were true? *Check all that apply*

- ❑ I helped the Fellow integrate the research conducted at the host institution into their research conducted in the U.S.
- ❑ I advised the Fellow as he/she continued work begun during the EAPSI summer
- ❑ I assisted the Fellow in preparing a presentation and/or publication on research conducted at the host institution
- ❑ I provided the Fellow (or helped the Fellow obtain) financial support to continue work on the research conducted during the EAPSI summer
- ❑ I helped the Fellow maintain a professional collaboration developed at the host institution
- ❑ I helped the Fellow use the EAPSI experience to benefit his/her subsequent job search
- ❑ I helped the Fellow to pursue additional international research opportunities
- ❑ Other: Please describe: [Textbox, 500]
- ❑ None of the above

D2. Which of the following benefits did you (and/or your research group) derive as a result of the EAPSI fellowship? *Check all that apply.*

- ❑ The Fellow introduced new knowledge, approaches, and/or technical skills
- ❑ The Fellow brought back samples or other materials unavailable or not easily accessible in the U.S.
- ❑ The Fellow's experience broadened our understanding of research enterprise in the foreign country
- ❑ The Fellow helped establish or maintain an important collaboration that has benefitted my research/my group's research
- ❑ The Fellow made my group and our research better known abroad
- ❑ The Fellow's experience changed the direction of our research or added a new dimension to our research
- ❑ We published papers which resulted from the Fellow's participation in EAPSI
- ❑ Other: Please specify. [Textbox, 1000]
- ❑ None of the above

D3. What was one of the most important benefits (if any) to you or to your research group that resulted from having a graduate student participate in the EAPSI program?
[Textbox, 2500]

D4. Did any of the following occur as a result of the Fellow's participation in the EAPSI program? *Check all that apply*

- ❑ The Fellow became distracted from other important research projects
- ❑ The Fellow's degree completion was delayed
- ❑ The Fellow left our graduate degree program altogether
- ❑ Conflicts arose over intellectual credit for research conducted in the host site
- ❑ There was tension between the Fellow and the others members of my group due to his/her participation in the EAPSI program
- ❑ Other. Please specify. [Textbox, 1000]
- ❑ None of the above.

Module E: Benefit of EAPSI to the US department

E1. Which of the following characterized the Fellow's department at [Grad_Institution] at the time that [Fellow Name] was enrolled ([EAPSI_YEAR])? *Check all that apply.*

- ❑ This department encouraged international collaborations
- ❑ Faculty in this department were rewarded for developing international research partnerships
- ❑ This department provided financial support to faculty pursuing international collaborations
- ❑ This department promoted (i.e., advertised) fellowships for graduate students or postdocs to conduct research in a foreign country
- ❑ This department hosted foreign post-docs and faculty visiting [Grad_Institution] for research-related purposes
- ❑ I do not recall
- ❑ None of the above

E2. As a result of this fellow's participation in the EAPSI program, did any of the following occur in this department (at [Grad_Institution]) during the 2 year-period following this Fellow's [EAPSI_YEAR] summer fellowship? *Check all that apply*

- ❑ *Graduate students* in this department became more interested in collaboration with international researchers
- ❑ *Faculty* in this department became more interested in collaboration with international researchers
- ❑ *Graduate students* in this department began collaborating with international researchers
- ❑ *Faculty* in this department began collaborating with international researchers
- ❑ Collaborations with international researchers raised the prestige of the department
- ❑ Collaborations with international researchers helped attract students, postdoctoral fellows, and other researchers to the department
- ❑ Collaborations with international researchers helped bring additional funding to the department
- ❑ Administrative policies, procedures, or structures in the department or in the institution were established to facilitate collaboration with international researchers
- ❑ I do not recall →GO TO E4
- ❑ Don't know, I was no longer at the department → GO TO E4
- ❑ None of the above→ GO TO E4

E3. Feel free to elaborate on any of the above and/or to provide additional examples of how the fellow's participation in the EAPSI program affected this department at [Grad Institution]. [Textbox. 2500]

E4. Do you think there have been any *disadvantages* for the department from having students participate in the EAPSI program?

- ❑ Yes Please specify. [Textbox, 2500]
- ❑ No
- ❑ I do not recall
- ❑ Don't know, I was no longer at the department

E5a. Was the duration of the EAPSI program appropriate for a graduate student?

- ❑ Yes
- ❑ No. Please elaborate [textbox]

E5b. Was the timing of the program appropriate (during the summer)?

- ❑ Yes
- ❑ No. Please elaborate [textbox]

E6. Would you recommend (or have you recommended) the EAPSI program to other graduate students? *Mark one answer*

- ❑ I have recommended/would recommend the program. → GO TO E6a
- ❑ I would not recommend the program. → GO TO E6b
- ❑ I am not sure

E6a. Why have you recommended (or why would you recommend) the EAPSI program to other graduate students? [Textbox, 2500] → GO TO E7

E6b. Why would you <u>not</u> recommend the EAPSI program to other graduate students? [Textbox, 2500]

E7. Has your experience as faculty advisor to an EAPSI fellow made you more or less likely to get involved in international collaboration? *Mark one answer*

- ❑ I am more likely to get involved in an international research collaboration
- ❑ I am less likely to get involved in an international research collaboration
- ❑ The EAPSI experience has not affected my likelihood to get involved in an international research collaboration

Module F: Your Current Research Collaborations

F1. Do you currently collaborate with researchers in countries outside the United States?

- ❑ Yes → GOTO F1a
- ❑ No → GOTO F2

F1a. Who are these colleagues? *Check all that apply*

- ❑ The researcher who hosted my former graduate student ([Fellow Name]) in [EAPSI_actualSite]
- ❑ Other researcher(s) in [EAPSI_actualSite].
- ❑ One or more researchers in other foreign countries.

F1b. What is the nature of your international collaborations? *Check all that apply*

	With the Fellow's EAPSI host	**With another researcher in [EAPSI_actualSite]**	**With researcher(s) in other foreign countries**
Co-author papers	❑	❑	❑
Co-author patent/license applications	❑	❑	❑
Co-sponsor professional conferences	❑	❑	❑
Share data or information	❑	❑	❑
Collaborate on a research project	❑	❑	❑
We send our graduate students and/or postdoctoral fellows to work in each other's laboratories/research sites	❑	❑	❑
Other. Please specify: [Textbox]			

F2. Which of the following are true? *Check all that apply*

- ❑ I have visited the host at the host's foreign research facility/institution
- ❑ The EAPSI host has visited me in the US
- ❑ A member of the EAPSI host's group visited me in the US or joined my group
- ❑ A foreign researcher connected to the EAPSI host, but not in the EAPSI host's group visited me in the US or joined my group
- ❑ A foreign researcher connected to the EAPSI host visited or joined another group in my department
- ❑ Because of the EAPSI program, I expanded my network of international collaborations in some other way. Please describe [textbox].
- ❑ None of the above

F3. Please feel free to share any thoughts or recommendations about the EAPSI program. [Textbox, 2500]

SUBMIT

Submit button takes respondent to Thank You screen

EXIT SCREEN:
If we have identified the wrong respondent or have erroneous information, display this screen and FLAG this respondent for Abt follow-up (weekly basis):

EAPSI Graduate Advisor survey

Please accept our apology.
The information you supplied suggests that you are not eligible to participate in this study **or** that we have reached you in error. We regret any inconvenience to you. If you have any questions about this study or you would like to make a comment, please contact one of the following individuals:

- Dr. Alina Martinez, Study Director at Abt Associates: EAPSI_survey@abtassoc.com, or (866) 421-6223 (toll free within the U.S.);
- John Tsapogas, Office of International Science and Engineering, NSF: jtsapoga@nsf.gov.

May we have permission to contact you by telephone to clarify your responses here? Entering your number does not obligate you to answer any questions.

❑ Yes, you may reach me at _ _ _ _ _ _ _ _ _ _ _ _ . [telephone digit entry] **Go to Best Times.**
❑ No, please do not contact me.

Best time(s) to call (*check all that apply*):
❑ Weekdays (9 to 5pm)
❑ Evenings (5 to 8pm)
❑ Saturday or Sunday 9 to 5pm

THANK YOU SCREEN (FROM SUBMIT BUTTON)

EAPSI host survey

Conclusion
Thank you for completing this survey. If you have any general comments about the survey, please write them below.

Textbox, 2500

If you have any questions about this survey or the study, please contact Dr. Alina Martinez, Study Director, Abt Associates, at (866) 421-6223 (may incur telephone charges if initiated outside the U.S.) or email her at EAPSI_survey@abtassoc.com. You may also contact John Tsapogas, who is overseeing this study at NSF, with any questions or comments: jtsapoga@nsf.gov.

Thank you for your assistance. We greatly appreciate your time and consideration.

Survey of Host Scientists for U.S. Graduate Students [LOCAL_PROGRAM_TEXT]

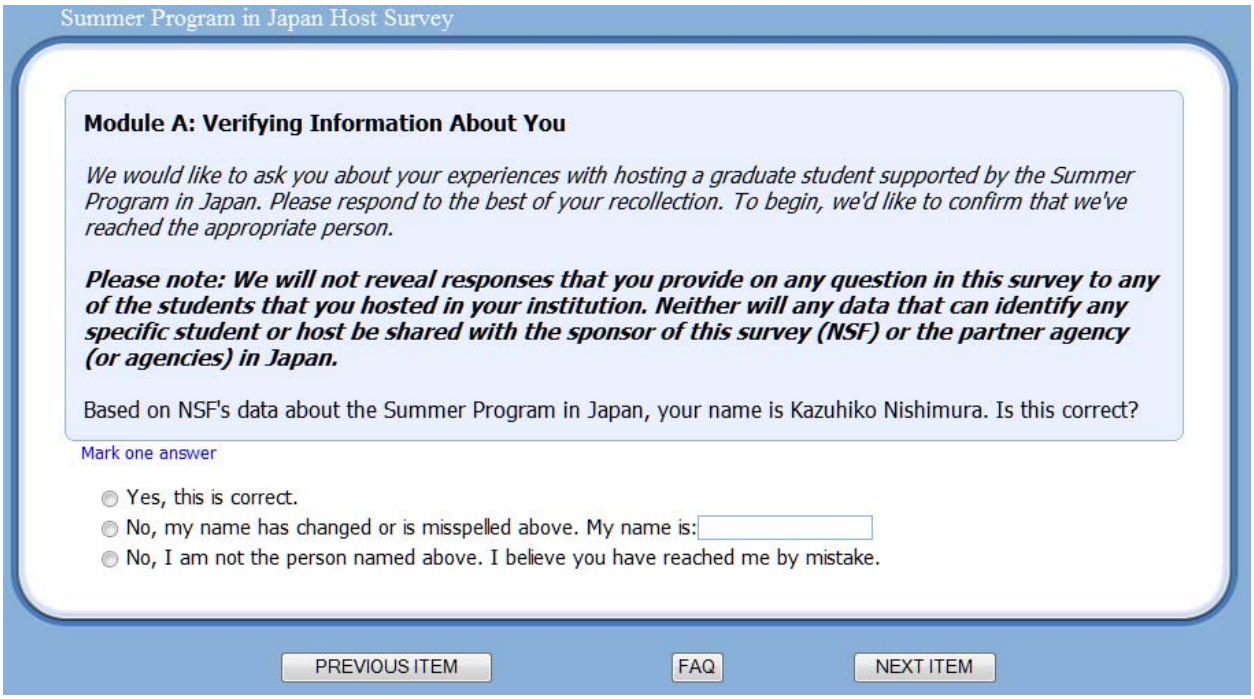
LOCAL_PROGRAM_TEXT was automatically filled in the online version with one of the following:

Summer Program in Japan
Summer Institute in Taiwan
Korea Summer Institute
Summer Institute in China
East Asia and Pacific Summer Institute (EAPSI) program in Singapore
East Asia and Pacific Summer Institute (EAPSI) program in New Zealand
East Asia and Pacific Summer Institute (EAPSI) program in Australia

Programming notes (not displayed in the survey respondents saw online) appear in red or brown text throughout.
Hyperlinked text appeared embossed and underlined in this document but was not be formatted this way onscreen unless noted (underlining was used for email addresses, but embossing was not).

General guidelines:

Each screen displayed one question at a time unless otherwise indicated.
Each screen displayed a standard set of Navigation buttons as shown below.



Some items contained placeholders for fields that were programmed to be auto-filled from the sample file for each respondent. These fields are enclosed in [brackets] and printed in brown.
Textboxes for open-ended responses are indicated with [textbox, 150] where the number indicates the length of the field (how many characters the respondent may type).

Sample variables:

HOST_NAME: Name of the respondent, the host researcher.

EAPSI_Site: Name of the country or site that co-sponsors the summer fellowship program. Values:

Australia
China
Korea
Japan
New Zealand
Singapore
Taiwan

EAPSI year the year that the respondent hosted the EAPSI fellow named in the survey. Values: 2000, 2001, 2002, 2003 2004, 2005, 2006, 2007, 2008, or 2009

Host institution the name of the university, research center, company where the host worked when EAPSI fellow visited.

Fellow Name: name of individual EAPSI fellow who visited the respondent (host)

Internal Variables:

LOCAL_PROGRAM_TEXT: Sample file reads in EAPSI_Site and LOCAL_PROGRAM_TEXT takes a value as follows

If EAPSI_SITE = "Japan" then LOCAL PROGRAM TEXT **= "**Summer Program in Japan"
Else if EAPSI_SITE = "Taiwan" then LOCAL PROGRAM TEXT = "Summer Institute in Taiwan"
Else if EAPSI_SITE = "Korea" then LOCAL PROGRAM TEXT = "Korea Summer Institute"
Else if EAPSI_SITE = "China" then LOCAL PROGRAM TEXT = "Summer Institute in China"
Else if EAPSI_SITE = "Singapore" then LOCAL PROGRAM TEXT = "East Asia and Pacific Summer Institute (EAPSI) program in Singapore"
Else if EAPSI_SITE = "New Zealand" then LOCAL PROGRAM TEXT = "East Asia and Pacific Summer Institute (EAPSI) program in New Zealand"
Else if EAPSI_SITE = "Australia" then LOCAL PROGRAM TEXT = "East Asia and Pacific Summer Institute (EAPSI) program in Australia"

PROGRAM: **Sample file reads in EAPSI_Site and PROGRAM takes a value as follows**

If EAPSI_SITE = "Japan" then PROGRAM **= "**Summer Program in Japan"
Else if EAPSI_SITE = "Taiwan" then PROGRAM = "Summer Institute in Taiwan"
Else if EAPSI_SITE = "Korea" then PROGRAM = "Korea Summer Institute"
Else if EAPSI_SITE = "China" then PROGRAM = "Summer Institute in China"
Else if EAPSI_SITE = "Singapore" then PROGRAM = "EAPSI program in Singapore"
Else if EAPSI_SITE = "New Zealand" then PROGRAM = "EAPSI program in New Zealand"
Else if EAPSI_SITE = "Australia" then PROGRAM = "EAPSI program in Australia"

Survey of Host Scientists for U.S. Graduate Students [LOCAL_PROGRAM_TEXT]

PROGRAMMER NOTE: LOCAL_PROGRAM_TEXT, PROGRAM, and EAPSI_site values should appear where indicated in place of [brackets] below:

Welcome and thank for your interest in this study. This survey is being conducted by Abt Associates Inc. and our subsidiary, AbtSRBI, for the National Science Foundation (NSF), to learn about the experiences of individuals who participated in the [**LOCAL_PROGRAM_TEXT**]. This survey will give NSF information about the international collaborations of U.S. graduate students and help NSF improve programs intended to foster a globally engaged scientific and engineering workforce. You are receiving this survey because you are listed in NSF's program database as a host of one or more U.S. graduate students ([**PROGRAM**] "fellows"). We estimate that it will take approximately 15 minutes to complete the survey.

Confidentiality and Participation

Participation in the survey is voluntary and nonparticipation will have no impact on you or your institution. You may skip questions on the survey or discontinue participation at any time. There are minimal risks associated with your participation. We take your privacy very seriously. Your responses to this survey will be protected under the U.S. Privacy Act. There is minimal risk of breach of confidentiality, and we have put in place procedures to minimize this risk. Reports will never identify you by name, and information from the study will only be reported in the aggregate at the program level, combined with about 500 other responses. We will not reveal responses that you provide on any question in this survey to any of the fellows that you hosted in your institution. Neither will any data that can identify any specific fellow or host be shared with the sponsor of this survey (NSF) or the partner agency (or agencies) in [**EAPSI_site**]. When we receive your survey we will detach and store separately your name and other identifying information that could be used to link you to your survey responses. Survey responses will be stored on a secure drive that is only accessible to members on the study team. Only study team web technicians and data analysts from Abt Associates and AbtSRBI will see individual responses that can be linked to you. Survey data files will be shared with NSF at the end of the study, only after study team members have examined the data to be free of any information that could help identify you; this cleaning includes procedures to prevent someone from inferring your identity by analyzing non-identifying data. Hence, we encourage you to respond candidly about your experiences. Separate from your individual responses to the survey we will provide NSF any updated contact information we have found or requested from you. None of this contact information will be linked in any way to your survey responses. At the conclusion of the study, Abt Associates and AbtSRBI will destroy all records, electronic or otherwise, that link you to your survey responses.

Questions

If you have questions about the study, please contact the study director, Alina Martinez of Abt Associates Inc. at (866) 421-6223 (may incur international telephone charges if initiated outside the U.S) or email her at EAPSI_survey@abtassoc.com. You may also contact the evaluation's program officer at NSF, John Tsapogas (jtsapoga@nsf.gov). If you have questions about your rights as a research participant, you may contact Teresa Doksum, the Abt Institutional Review Board Administrator at (877) 520-6835 (may incur international telephone charges if initiated outside the U.S) or by email: irb@abtassoc.com. To learn more about this study, please refer to the **Frequently Asked Questions** page.

Consent

Please click on "Begin" if you agree to participate in this study. **BEGIN**

This study's IRB approval number is #0494, valid from 8/6/2010 to 8/5/2011. For questions, please contact Teresa Doksum, IRB Administrator, Abt Associates, at IRB@abtassoc.com. The valid OMB control no. for this information collection is 3145-0214. (Expires on 12/31/13).

Navigating through the survey:

As you work through the survey, your responses are automatically saved. You may change a response by clicking on the **PREVIOUS ITEM** button. Use the **NEXT ITEM** button to advance to the next question. At any time, you close your browser if you wish to temporarily pause the survey and return to it at a later time. On each page of the survey, you may click on the "**FAQs**" button if you have a question during the survey or need information about how to contact the survey administrator. When you have completed the survey, please click on the **SUBMIT** button at the end of the survey. You may submit the survey even if there are some questions that you choose not to answer.

CONTINUE

FAQs are Optional screens, displayed only if R clicks on Frequently Asked Questions button.
Programmer note: Note that variables below must be auto-completed in Items 1, 2, 3, 4, 6 and 10

FREQUENTLY ASKED QUESTIONS

What is the [PROGRAM]?

The [**LOCAL PROGRAM TEXT**] is a program in which the National Science Foundation (NSF) and its partner organizations in Australia, China, Japan, Korea, New Zealand, Singapore, and Taiwan cooperate to provide U.S. graduate students an opportunity to spend eight to ten weeks collaborating with a host researcher at a university or research institute in one of these locations. The program matches accomplished researchers in the host location with promising U.S. graduate students to foster international collaboration.

Why are you doing this study?

NSF is interested in learning about the experiences of researchers who have hosted one or more graduate students from the United States as part of the [**PROGRAM**]. In particular, NSF would like to understand how host researchers perceive the program and the students they have hosted, and what kinds of benefits and challenges host researchers experienced. The information collected in the study will help NSF make improvements to the program, and understand how best to support and encourage international collaboration.

Why have I been selected to participate in this survey?

You have been selected to participate because we have identified you as having hosted one or more U.S. graduate students participating in the [**PROGRAM**].

How did you get my contact information?

We identified you from records maintained by the National Science Foundation on [**PROGRAM**] participants and the scientists who hosted them. We then confirmed your contact information through an internet search.

How long will this survey take to complete?

We estimate that the survey will take about 15 minutes.

How will you use my comments?
Responses from all survey respondents will be used to answer questions about the experiences of EAPSI host researchers with the program and with the guest students. We will not reveal responses that you provide on any question in this survey to any of the students that you hosted in your institution. Neither will any data that can identify any specific student or host be shared with the sponsor of this survey (NSF) or the [**PROGRAM**] partner agency in [**EAPSI_site**].

What happens if I don't answer this survey?
Participation in the survey is voluntary. Abt Associates will not share information with the National Science Foundation or its partner agencies in your location about your decision to participate or not to participate.

Does this study have human subjects review clearance?
Yes, the study was approved by Abt Associates' Institutional Review Board. If you have any concerns about your participation in this survey, please contact Teresa Doksum, Institutional Review Board Administrator at Abt Associates, at (877) 520-6835 or via email at irb@abtassoc.com. A call to this number may incur international charges.

Who is funding the study?
The study has been funded by the National Science Foundation under contract GS-10F-0086K. Abt Associates and AbtSRBI will complete the study.

Who are Abt Associates Inc and AbtSRBI?
Abt Associates is an independent research firm headquartered in Cambridge, Massachusetts. AbtSRBI is a wholly-owned subsidiary of Abt Associates specializing in large-scale data collection and public opinion research. NSF has contracted with Abt Associates and AbtSRBI to design and implement a survey of researchers who hosted a U.S. graduate student participating in [**PROGRAM**].

EAPSI Host Survey

Module A: Verifying Information About You

We would like to ask you about your experiences with hosting a graduate student supported by the [PROGRAM]. Please respond to the best of your recollection. To begin, we'd like to confirm that we've reached the appropriate person.

Please note: We will not reveal responses that you provide on any question in this survey to any of the students that you hosted in your institution. Neither will any data that can identify any specific student or host be shared with the sponsor of this survey (NSF) or the partner agency (or agencies) in [EAPSI_site].

A1. Based on NSF's data about the [PROGRAM], your name is [HOST_NAME]. Is this correct? *Mark one answer*

- ❑ Yes, this is correct.
- ❑ No, my name has changed or is misspelled above. My name is: [Textbox, 75] Set HOST_NAME = entered text.
- ❑ No, I am not the person named above. I believe you have reached me by mistake. EXIT SURVEY

A3. Based on NSF data, you hosted one or more [PROGRAM] fellows from the United States most recently in [EAPSI_Year]. Is this information correct? *Mark one answer*

- ❑ Yes, the year is correct.
- ❑ No, the year is incorrect. The correct year is (enter 4-digit year): [Textbox, yyyy] Set EAPSI_Year = entered year
- ❑ I do not recall the exact year

A4. Based on NSF's data about the [PROGRAM], you were at [Host institution] in [EAPSI_YEAR]. Is this information correct? *Mark one answer*

- ❑ Yes, the institution is correct.
- ❑ No, the institution is incorrect. The correct institution is: [Textbox, 150] Set Host institution = entered text

A5. During the week of October 1, 2010, were you working at [Host institution], the institution where you worked in [EAPSI_YEAR]? *Mark one answer*

- ❑ Yes, I was working at this institution then
- ❑ No, I no longer work there. I am now working at (please tell us the name of your current employer, university, or company): [Textbox, 150]

A5a. As of October 1, 2010, approximately what percentage of your current research group was from other countries (that is, places other than [EAPSI_SITE])? *Mark one answer*

- ❑ 0-10%
- ❑ 11-25%
- ❑ 26-50%
- ❑ 51-75%
- ❑ >75%
- ❑ Not applicable, I do not work in a group

A6. Which of the following characterizes the department (or research unit within an institute) at [HOST INSTITUTION], where you most recently participated as a [PROGRAM] host? *Check all that apply.*

- ❑ The department (or research unit) where I was a [PROGRAM] host encouraged faculty (or employees) to work with graduate students from the United States
- ❑ The department (or research unit) where I was a [PROGRAM] host encouraged international collaborations
- ❑ Faculty (or employees) in the department (or research unit) where I was a [PROGRAM] host were rewarded for developing international research partnerships
- ❑ The department (or research unit) where I was a [PROGRAM] host provided financial support to faculty (or employees) pursuing international collaborations
- ❑ The department (or research unit) where I was a [PROGRAM] host promoted (that is, advertised) fellowships and other opportunities for researchers in my country to conduct research in another country
- ❑ The department (or research unit) where I was a [PROGRAM] host hosted foreign researchers visiting my institution for research-related purposes
- ❑ None of the above
- ❑ I do not recall

A2. Based on NSF's data about the [PROGRAM], at one time you hosted a graduate student from the United States named [Fellow name]. Is this information correct? *Mark one answer*

- ❑ Yes, this is correct.
- ❑ I do not recall this student by name, but I have hosted U.S. graduate students as part of the [PROGRAM]. GO TO A2a.
- ❑ No, I did not host this person–or any other graduate student from the United States. EXIT SURVEY.
- ❑ I never participated in [PROGRAM] for U.S. graduate students. EXIT SURVEY.

A2a. Although you do not recognize the former [PROGRAM] fellow, "[FELLOW NAME]," NSF's data about [PROGRAM] indicate that you hosted a graduate student from the United States (or more than one student) as part of the [PROGRAM] in [EAPSI_YEAR]. We would appreciate it if you would continue with the survey. Please answer the questions that follow based on your most recent experience hosting U.S. graduate students in the [PROGRAM]. Please click on "Next Item" to continue. **GO TO ITEM E4**

Module B: Becoming a Host to a U.S. Graduate Student

The remaining items on this survey refer to the [PROGRAM] Fellow named above ([Fellow name]) or to the weeks ([EAPSI_YEAR]) during which you hosted this individual at your institution ([HOST_INSTITUTION]). If you have hosted more than one [PROGRAM] Fellow, please answer items on this survey with respect to [Fellow name], who you hosted in [EAPSI_ Year].

B2. Why did you decide to host this [PROGRAM] Fellow ([Fellow Name])? *Check all that apply*

- ❑ I was interested in the project proposed by the Fellow
- ❑ I was interested in establishing or maintaining collaboration with a US researcher
- ❑ I personally knew, knew of, or previously collaborated with the Fellow
- ❑ I personally knew, knew of, or previously collaborated with the Fellow's graduate advisor
- ❑ I personally knew, knew of, or previously collaborated with researchers at the Fellow's institution
- ❑ I had a positive experience with the [PROGRAM] in the past
- ❑ I had a positive experience with another international program
- ❑ To improve the status of my department and/or institution
- ❑ To create an international environment in my research group
- ❑ To attract students/postdocs to my research
- ❑ To learn new methodologies, approaches, or tools from the Fellow
- ❑ In my field, individuals trained at U.S. graduate institutions are highly sought-after
- ❑ My research area is particularly suitable for international collaboration
- ❑ Other: [Textbox, 300]

B3. Did you have any of the following concerns about hosting this Fellow ([FELLOW_NAME])? *Check all that apply*

- ❑ The Fellow's proposed project was especially risky
- ❑ The length of the [PROGRAM] was too short for the proposed project
- ❑ I was concerned about the fellow's level of commitment to a collaboration with me
- ❑ I was concerned about the risks of international collaboration in general
- ❑ I had a negative experience with the [PROGRAM] in the past
- ❑ I had a negative experience with other U.S. graduate students fellows (not affiliated with the [PROGRAM])
- ❑ I was concerned about the integrating this student into my research group
- ❑ I was concerned that I might not (or my research group might not) benefit from hosting this student
- ❑ In my field, individuals trained at U.S. graduate institutions sometimes have gaps in their knowledge, skills, or abilities
- ❑ My research area is not particularly suitable for international collaboration
- ❑ Other, please specify: [Textbox, 300]

B4. Before hosting [Fellow Name] in [EAPSI_YEAR], had you ever before hosted a visiting graduate student from the United States? *Mark one answer*.

- ❑ Yes, I had hosted another [PROGRAM] Fellow or Fellows from the United States previously
- ❑ Yes, but the graduate student(s) was not sponsored by the [PROGRAM]
- ❑ No, I had never before hosted visiting graduate students from the United States

B5. Prior to your participation as a [PROGRAM] host, had you visited the United States for educational, research, or other professional purposes? *Check all that apply*

- ❑ Yes, I was an undergraduate student in the United States
- ❑ Yes, I was a graduate student in the United States
- ❑ Yes, I was a postdoctoral fellow in the United States
- ❑ Yes, I was a visiting scientist in the United States
- ❑ Yes, I was a faculty member in the United States
- ❑ Yes, I came to the United States for a conference, a workshop, or a meeting
- ❑ Other reason for visiting the United States. Please specify: [Textbox, 300]
- ❑ No, before participating as a [PROGRAM] host I had not visited the United States for any professional purposes

B6. Did you know [Fellow name] or one of his/her colleagues before you hosted this [PROGRAM] fellow? *Mark one answer*

- ❑ Yes, I knew this fellow before he (or she) came to [EAPSI_site]
- ❑ I did not know the fellow but I knew one (or more) of the fellow's graduate faculty advisors
- ❑ I knew the fellow and one or more of the fellow's graduate faculty advisors
- ❑ No, I did not know the fellow or any of the fellow's graduate advisors

B7. How would you characterize the ease or difficulty of the following aspects of *arranging* the Fellow's visit?

	Easy	Somewhat difficult	Very Difficult	Not applicable (I did not provide this or make these arrangements for the Fellow)
Providing supporting materials for the Fellow's application to NSF	❑	❑	❑	❑
Providing assistance with obtaining a visa	❑	❑	❑	❑
Arranging the Fellow's lodging	❑	❑	❑	❑
Arranging the Fellow'`s office space	❑	❑	❑	❑
Arranging the Fellow's access to buildings, laboratories, or to other institutional facilities	❑	❑	❑	❑
Finding an appropriate research project	❑	❑	❑	❑

B7a. Please describe any details you would like to share about any challenging aspects of arranging the Fellow's visit. [Textbox, 2500]

Module C: Your Experiences as a [PROGRAM] Host

C1. During this [PROGRAM] Fellow's ([FELLOW_NAME]) visit to your institution, which of the following types of people worked directly with the visiting fellow on research? *Check all that apply*

- ❑ I worked directly with the fellow
- ❑ Research scientists/engineers in my research group worked directly with the fellow
- ❑ Postdoctoral fellows in my research group worked directly with the fellow
- ❑ Graduate students in my research group worked directly with the fellow
- ❑ Undergraduate students in my research group worked directly with the fellow
- ❑ Other (please describe): [textbox, 300]
- ❑ The visiting fellow worked directly with other visiting [PROGRAM] fellows
- ❑ The visiting student worked independently without supervision
- ❑ Other (please specify): [Textbox, 300]
- ❑ None of the above

C2. In [EAPSI_YEAR], what was the size of your research group at [Host Institution]? Do not include visiting Fellows in your answer. *Mark one answer*

- ❑ 1 person (myself)
- ❑ 2 -5 people
- ❑ 6-10 people
- ❑ 11-20 people
- ❑ > 20 people
- ❑ I do not remember

C2a. In [EAPSI_YEAR], approximately what percentage of your research group was from other countries (besides [EAPSI_SITE])? Do not include visiting Fellows in your answer. *Mark one answer*

- ❑ 0-10%
- ❑ 11-25%
- ❑ 26-50%
- ❑ 51-75%
- ❑ >75%
- ❑ I do not recall
- ❑ Not applicable, I did not work in a research group

C3. In [EAPSI_YEAR], who was primarily involved in the following activities on which you and the [PROGRAM] Fellow ([FELLOW_NAME]) worked?

	Mostly the Fellow independently (or the Fellow and his/her U.S. advisor)	**Mostly me or members of my group without the Fellow**	**The Fellow and I (and/or members of my research group) together about equally**	**Not applicable (this activity was not part of the research)**
Developing the ideas, hypotheses, broad framework, or vision for the research project	❑	❑	❑	❑
Researching literature or research base relevant to the project	❑	❑	❑	❑
Keeping records, tracking supplies, resources,	❑	❑	❑	❑
Developing instrumentation, software, equipment, or data collection processes	❑	❑	❑	❑
Collecting data or carrying out simulations	❑	❑	❑	❑
Analyzing data or observations	❑	❑	❑	❑
Interpreting results	❑	❑	❑	❑
Planning or developing follow-up work based on results	❑	❑	❑	❑
Written, oral dissemination of results (publications, presentations)	❑	❑	❑	❑

C4. Do you agree or disagree with the following aspects of your participation as host to a [PROGRAM] Fellow?

	Strongly disagree	Disagree	Agree	Strongly agree	Does not apply
The Fellow integrated with staff/members of my research group	❑	❑	❑	❑	❑
The Fellow had sufficient knowledge and expertise to be a full participant in a research collaboration with me	❑	❑	❑	❑	❑
The amount of time for the fellowship experience was too short	❑	❑	❑	❑	❑
Language was a barrier to the Fellow's ability to interact with me and/or my group	❑	❑	❑	❑	❑
The Fellow was willing to take appropriate risks necessary for research	❑	❑	❑	❑	❑
The Fellow exercised appropriate caution in his/her approach to research	❑	❑	❑	❑	❑
The Fellow was hard-working and dedicated	❑	❑	❑	❑	❑
The Fellow spent sufficient time working on the project	❑	❑	❑	❑	❑
Scientific cultures of our countries are similar, making productive collaboration possible	❑	❑	❑	❑	❑
Differences in lifestyles and general cultures of our countries are a barrier to collaboration.	❑	❑	❑	❑	❑

C6. Which of the following were true about you and the EAPSI Fellow [Fellow Name]? *Check all that apply*

- ❑ Our research interests were well-matched
- ❑ Our work styles were well-matched
- ❑ Our goals and expectations for the experience were similar

Module D: Outcomes of Participation as a [PROGRAM] Host

D1. Since the conclusion of this fellow's summer research with you, have you collaborated or communicated further with [Fellow Name]? *Mark one answer*

- ❑ I have collaborated further with this individual on research → GO TO D1a
- ❑ I have communicated further with this individual, but we have not collaborated further → GOTO D2
- ❑ I have not communicated further with this individual → GOTO D2

D1a. How recently has the latest collaboration occurred? *Mark one answer.*

- ❑ Within the past 6 months
- ❑ Within the past 12 months
- ❑ 1-2 years ago
- ❑ 3 or more years ago

D1b. What was/is the nature of your collaboration? *Check all that apply*.

- ❑ I have a position in this individual's current institution (within the U.S.)
- ❑ This individual has a position at my current institution (outside the U.S.)
- ❑ We have exchanged ideas, data, research results, or tools
- ❑ We have co-authored research papers together
- ❑ We have co-advised students together
- ❑ We have visited each other at our institutions
- ❑ Other: [Textbox, 300]

GO TO D3a

D2. Why do you no longer collaborate with this former fellow? *Check all that apply*

- ❑ Our research interests diverged
- ❑ One or both of us lacked funding needed to maintain collaboration
- ❑ Language differences have hindered further collaboration
- ❑ Political or cultural differences have hindered further collaboration
- ❑ Geographic distance has hindered further collaboration
- ❑ I did not think that further collaboration would be beneficial for me
- ❑ The [PROGRAM] fellow did not actively pursue or maintain further collaboration with me
- ❑ One (or both) of us is too busy with other projects
- ❑ Other – specify [textbox, 300]

D3a. Are you currently collaborating with any of this [PROGRAM] fellow's colleagues? *Check all that apply*

- ❑ With this individual's former faculty advisor
- ❑ With graduate students who currently work with this former [PROGRAM] fellow
- ❑ With postdoctoral fellows who currently work with this former [PROGRAM] fellow
- ❑ With other researchers working with this former [PROGRAM] fellow
- ❑ With none of the above
- ❑ I'm not sure if my collaborating partner is a colleague of this former [PROGRAM] fellow

D3b. Are you currently collaborating with <u>other</u> U.S. researchers?

- ❑ Yes→GO TO D3d
- ❑ No→ GO TO D4

D3d. Have your collaborations with any U.S. researchers resulted from your participation as a [PROGRAM] host? *Mark one answer*

- ❑ Yes
- ❑ No

D4. Please indicate the number of the following which you published or produced in collaboration with your former [PROGRAM] fellow, [**Fellow Name**]

Total number published/ in-press with this former [PROGRAM] fellow	
	Peer-reviewed journal articles
	Peer-reviewed conference publications (e.g. abstracts, conference papers, posters)
	Patents, registered or pending
	Book chapter(s) (e.g., in edited volumes)

D4a. In what year did you most recently publish a paper or register a patent with this fellow? (enter 4-digit year): **[**Textbox, yyyy**]**

Module E: Satisfaction with Hosting [PROGRAM] fellow/fellows

We will not reveal responses that you provide on any question in this survey to any of the fellows that you hosted in your institution. Neither will any data that can identify any specific fellow or host be shared with the sponsor of this survey (NSF) or with the [PROGRAM] partner agency in [EAPSI_site].

E1. On a scale of 1-5, with 1 being "*much less satisfied*," and 5 being "*much more satisfied*," how satisfied were you overall with this [PROGRAM] fellow [Fellow Name] compared to other graduate students? *Mark one answer.*

①	②	③	④	⑤
Much less satisfied than I have been with other graduate students	**Somewhat less satisfied** than I have been with other graduate students	**Equally satisfied** as I have been with other graduate students	**Somewhat more satisfied** than I have been with other graduate students	**Much more satisfied** than I have been with other graduate students

If you cannot select a response <u>because you have not worked with any other graduate students</u>, please check here: ❑ If Respondent checks this box no rating should be allowed

E1a. What did you find most satisfying or unsatisfying about this fellow or about the [PROGRAM] experience as a whole? [Textbox, 2500]

E2. Which of the following benefits (if any) did *you* derive as a result of your participation in the [PROGRAM]? *Check all that apply*

- ❑ Hosting [PROGRAM] fellows was the first opportunity I had to work with US graduate students
- ❑ I established or renewed a collaboration with other US researcher/researchers
- ❑ I published (or researchers in my group published) research papers based on the collaborative work with this [PROGRAM] Fellow
- ❑ I obtained (or researchers in my group obtained) funding based on the collaborative work
- ❑ I gave (or researchers in my group gave) one or more presentations based on the collaborative work
- ❑ I learned (or researchers in my group learned) new methodological/analytical techniques or theoretical approaches
- ❑ I obtained (or researchers in my group obtained) access to resources not easily available at my institution or location
- ❑ I became (or researchers in my group became) more familiar with the research enterprise in the United States
- ❑ Participation in the program changed the direction of some research projects in my group
- ❑ Participating in the program helped advance my career
- ❑ Participating in the program enhanced my interest in collaborating with US researchers
- ❑ Participating in the program helped me recruit other graduate students or postdoctoral fellows
- ❑ Hosting a [PROGRAM] Fellow (or several Fellows) enhanced the recognition of my work by peers
- ❑ I improved my English language skills
- ❑ Other benefits (please describe): [textbox, 300]
- ❑ None of the above

E3. Did you encounter any of the following challenges when hosting a [PROGRAM] fellow? *Check all that apply*

- ❑ The fellow's lack of familiarity with the primary language spoken here made collaboration more difficult than anticipated
- ❑ The fellow and I had differences of opinion about the direction of research
- ❑ The fellow had unanticipated gaps in his/her preparation to conduct research with me
- ❑ The fellow did not devote enough time/effort to the research collaboration
- ❑ The fellow lacked sufficient understanding of cultural norms in my country
- ❑ The fellow was disrespectful, caused conflict within my research group
- ❑ The fellow needed too much guidance
- ❑ The fellow worked too independently, did not work well as a collaborator or team member
- ❑ Other challenges; please specify: [textbox, 300]
- ❑ None of the above

E4. Have any of the following taken place *at your institution* as a result of your participation as host to a [PROGRAM] Fellow? *Check all that apply*

- ❑ My colleagues increased their own collaborations with US researchers
- ❑ Administration in my department (or research unit) became more supportive of collaboration with US researchers
- ❑ Additional policies, procedures, or structures have been put in place at my institution to facilitate international collaboration
- ❑ Collaborations with US researchers helped attract students and other researchers to my institution
- ❑ Other changes at my institution as a result of hosting [PROGRAM] Fellow or Fellows (please describe): [textbox, 1500]
- ❑ None of the above

E4a. Can you provide any examples of how participating in the [PROGRAM] affected your institution? Please mark "No" if your participation as a [PROGRAM] host had no effect on your institution. [Textbox, 2500] ❑ No. GO TO E5a.

E5a. What were the best aspects of your experience with the [PROGRAM]? [Textbox, 2500]

E5b. What were the most challenging aspects of your experience with the [PROGRAM]? [Textbox, 2500]

E6. Were there any unexpected outcomes of your participation in the [PROGRAM] experience? [Textbox, 2500]

Programmer note: Item E7a (or Item E7b) should appear on same screen as Item E7 if user selects response option (1) or (2)

E7. Would you recommend (or have you recommended) to others that they host [PROGRAM] fellows? *Mark one answer*

- ❑ I would recommend (or I have recommended) the program. GO TO E7a
- ❑ I have not recommended the program, and I would not recommend the program. GO TO E7b
- ❑ I am not sure GOTO E7c

E7a. Why? [Textbox, 2500] GO TO E7c

E7b. Why not? [Textbox, 2500] GO TO E7c

E7c. Based on your experience hosting one or more graduate students from the United States, what recommendations would you make to other U.S. graduate students about working with researchers in your country? [Textbox, 2500]

E8. Please feel free to share any additional thoughts or recommendations about [PROGRAM]. [Textbox, 2500]

SUBMIT

Submit button takes respondent to Thank You screen

EXIT SCREEN:
If we have identified the wrong respondent or have erroneous information, display this screen and FLAG this respondent for Abt follow-up.

[PROGRAM] host survey

Please accept our apology.
The information you supplied suggests that you are not eligible to participate in this study **or** that we have reached you in error. We regret any inconvenience to you. If you have any questions about this study or you would like to make a comment, please contact one of the following individuals:

- Dr. Alina Martinez, Study Director at Abt Associates: EAPSI_survey@abtassoc.com or (866) 421-6223 (may incur telephone charges if initiated outside the U.S.);
- John Tsapogas, Office of International Science and Engineering, NSF: jtsapoga@nsf.gov.

May we have permission to contact you by email in order to clarify your responses here? Answering "yes" does not obligate you to answer any questions.

- ❑ Yes, you may contact me. My preferred email address is: [textbox 150]
- ❑ No, please do not contact me.

Thank you very much.

THANK YOU SCREEN (FROM SUBMIT BUTTON)

[PROGRAM] host survey

Conclusion
Thank you for completing this survey. If you have any general comments about the survey, please write them below.

Textbox, 2500

If you have any questions about this survey or the study, please contact Dr. Alina Martinez, Study Director, Abt Associates, at (866) 421-6223 (may incur telephone charges if initiated outside the U.S.) or email her at EAPSI_survey@abtassoc.com. You may also contact John Tsapogas, who is overseeing this study at NSF, with any questions or comments: jtsapoga@nsf.gov.

Thank you for your assistance. We greatly appreciate your time and consideration.

Appendix F: Benchmark to National Data

To place the outcomes of all EAPSI applicants with the broader context of national science and engineering degree holders, the outcomes of EAPSI fellows and all EAPSI applicants were compared to national estimates for science and engineering graduates. Specifically, the outcomes of EAPSI PhD graduates were compared against national estimates from the Survey of Doctoral Recipients (SDR), and the outcomes of EAPSI master's graduates were compared against estimates of individuals who had completed master's degrees in the National Survey or Recent College Graduates (NSRCG).

The 2006 and 2008 SDR was used to compare the EAPSI applicants, whose highest degree is a doctorate, to those of a nationally representative sample of science, engineering and health (SEH) doctoral degree recipients on key employment, postdoctoral appointment, and international collaboration variables. The 2006 and 2008 NSRCG was used to compare the EAPSI applicants, whose highest degree is masters, to a nationally representative sample of SEH master's degree recipients on key employment, and international collaboration variables.

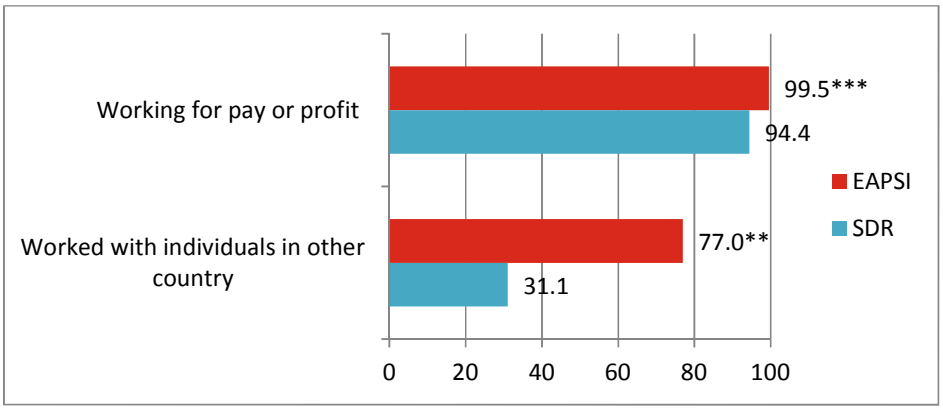
These comparisons are descriptive in nature and are not intended to address the impacts of the EAPSI program. Thus, findings should be interpreted with an understanding that there may be uncontrolled initial differences between EAPSI applicants and those who responded to the SDR and the NSRCG.

In these benchmarking analyses covariates are grand mean centered using the SDR and EAPSI samples (or the NSRCG and the EAPSI samples). Details of the sampling frame and how the SDR data (2006 and 2008 waves) and the analyses conducted are provided in Appendix D.

Benchmark Comparison of EAPSI Applicants to National Samples

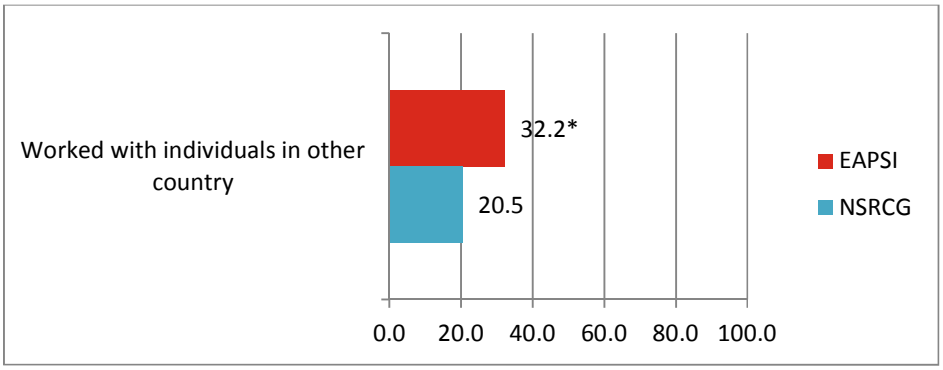
EAPSI applicants were compared to the national samples on the frequency with which they worked with individuals in other countries (Exhibit F.1 and Exhibit F.2). EAPSI PhD applicants were more likely to be working "for pay or profit" (almost 100 percent of EAPSI applicants with PhDs versus 94 percent of the SDR sample, a statistically significant difference). Both EAPSI applicants with PhDs and those with master's degrees were significantly more likely to be working with individuals in other countries, compared to their counterparts nationally (77 percent of EAPSI PhD applicants versus 31 percent of the SDR sample, and 32 percent of EAPSI applicants with master's degrees compared to 21 percent of master's degree holders in the NSRCG).

Exhibit F.1: Work and International Collaborations of EAPSI Doctoral Degree Applicants and SDR Sample during Reference Week



*p<0.05, **p<0.01, ***p<0.001
NOTES: *Working for pay/profit:* This item was answered by former EAPSI applicants who had earned a PhD as of October 1, 2010 (N=642 Missing=0) and by SDR 2008 respondents who had completed a PhD by October 1, 2008 (N=29,974 Missing=0). *Worked with individuals in other countries:* This item was answered by former EAPSI applicants who had earned a PhD and were employed during the week of October 1, 2010 (N=615 Missing=19) and by SDR 2006 respondents who had completed a PhD and were employed the week of April 1, 2006 (N=27,119 Missing=0). This item was not included in the SDR 2008 wave.
SOURCE: EAPSI Applicant Survey–Items D1a, D1c, D2 and D4 and SDR Survey 2008–Items A1 and A27

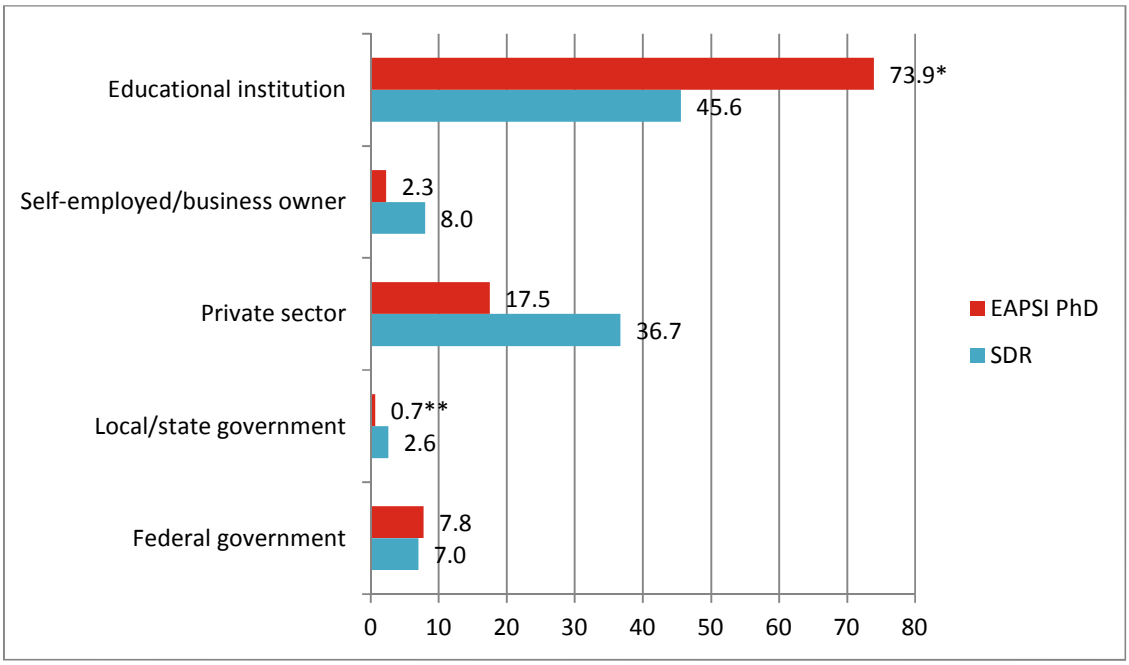
Exhibit F.2: International Collaborations of EAPSI Master's Degree Applicants and NSRCG Sample during Reference Week



*p<0.05, **p<0.01, ***p<0.001
NOTES: The NSRCG sample excluded individuals living outside of the United States. This item was answered by EAPSI applicants whose highest degree earned was a master's degree, and were employed during the week of October 1, 2010 (N=222 Missing=0) and by NSRCG respondents who had completed a master's degree and were employed as of April 1, 2006 (N=3,973 Missing=0).
SOURCE: EAPSI Applicant Survey–Items D1a, D1c, and D4. NSRCG Survey 2006–Items B1 and B27. This item was not included in the NSRCG 2008 survey wave.

Additional comparisons were conducted to investigate the differences in the work settings between EAPSI applicants with PhDs and national estimates for similar S&E graduates (Exhibit F.3). EAPSI applicants were more likely to be employed in an educational institution (74 versus 46 percent) and less likely in state or local government (1 versus 3 percent).

Exhibit F.3: Employers of EAPSI Doctoral Degree Applicants and SDR Sample during Reference Week



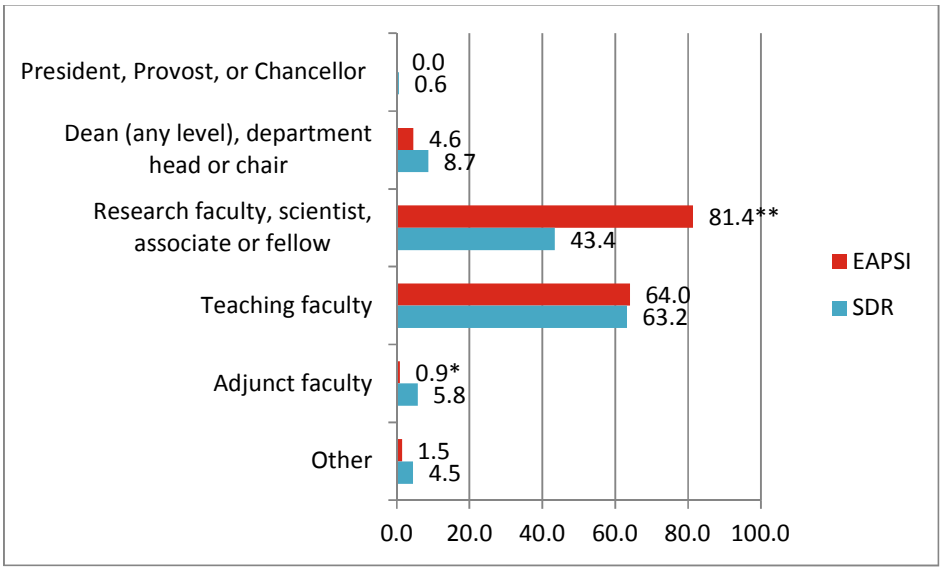
*p<0.05, **p<0.01, ***p<0.001

NOTE: Reference week was October 1, 2010 for EAPSI applicants and October 1, 2008 for the SDR sample. This item was answered by all former EAPSI applicants who had earned a PhD and were employed as of October 1, 2010 (N= 378 Missing=0) and by SDR 2008 respondents who had completed a PhD and who were employed during the week of October 1, 2008 (N=26,191 Missing=0). Items from which these data derive differed slightly between the EAPSI Applicant Survey and the SDR 2008; thus, Local Government (city, county, school district) and State Government (including state colleges/universities) were combined into a single category for both groups; and U.S. Federal Government and U.S. MILITARY service, activity duty or Commissioned Corps (e.g., USPHS, NOAA) were combined for both groups.

SOURCE: EAPSI Applicant Survey–Items D1c, D2 and D3. SDR Survey 2008–Items A1, A11.

Among those working in institutions of higher education, EAPSI applicants were more likely to have a position that involved research (81 percent of applicants versus 43 percent from the SDR sample, a significant difference) and less likely to be adjunct faculty (1 percent versus 6 percent, a significant difference) (Exhibit F.4).

Exhibit F.4: EAPSI PhD Applicants and SDR Samples' Positions in Academic Institutions



*p<0.05, **p<0.01, ***p<0.001

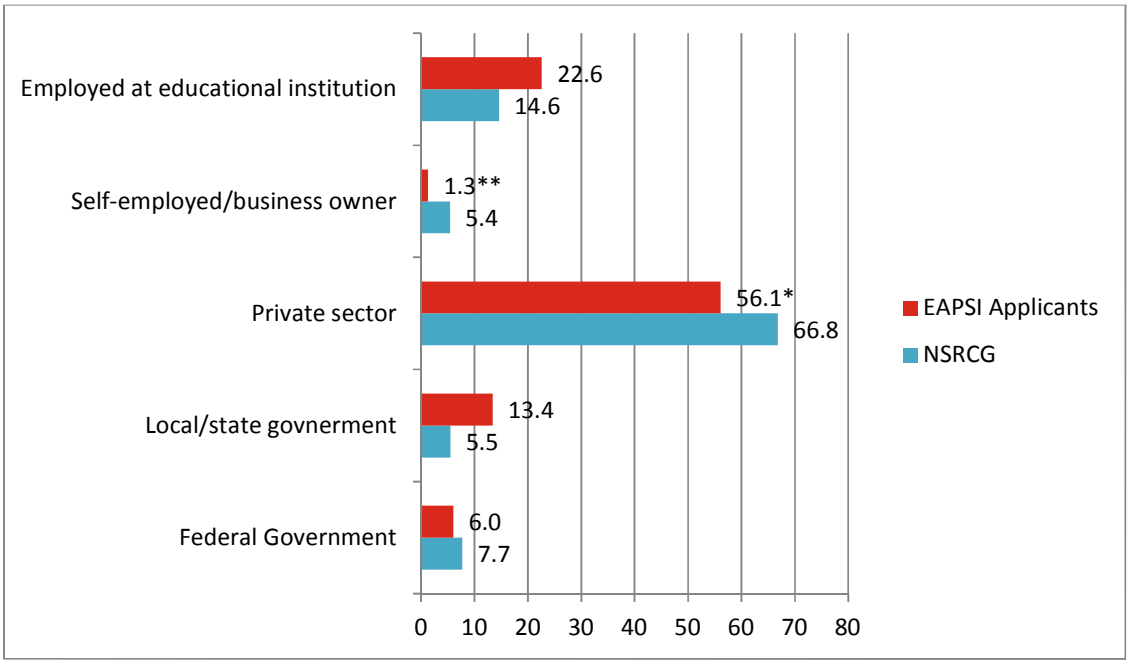
NOTES: The academic positions are not mutually exclusive: Individuals could select more than one response. For example, individuals could hold a research faculty position and a teaching faculty position simultaneously.

These items were answered by EAPSI applicants who had had earned a PhD, were working at an educational institution (other than in a postdoctoral position) during the week of October 1, 2010 and who did not report working in a preschool, elementary, middle, or secondary school or system (EAPSI N=195 Missing=0) and by SDR respondents who had completed a PhD, who were working in an educational institution during the week of October 1, 2008, and who did not report working in a preschool, elementary, or secondary school system (SDR N=11,773 Missing=0).

SOURCE: EAPSI Applicant Survey–Items D1c, D2, D2a and D2c. SDR Survey 2008–Items A1, A12, and A15.

Similar comparisons of employers were performed for EAPSI applicants who had received master's degrees. Applicants were significantly less likely to be self-employed or business owners (1 versus 5 percent) and less likely to work in the private sector (56 versus 67 percent) (Exhibit F.5).

Exhibit F.5: Employers of EAPSI Applicants and NSRCG Sample during Reference Week



*p<0.05, **p<0.01, ***p<0.001

Note: Reference week was October 1, 2010 for EAPSI fellows and October 1, 2008 for the NSRCG sample. This item was answered by EAPSI awardees who had completed their EAPSI fellowship, whose highest degree earned was a master's degree and were employed as of October 1, 2010 (N=323 Missing=0) and by NSRCG respondents who had completed a master's degree and were employed as of October 1, 2008. (N=4,326 Missing=0). Items from which these data derive differed slightly between the EAPSI Applicant Survey and the NSRCG 2008; thus, Local Government (city, county, school district) and State Government (including state colleges/universities) were combined into a single category for both groups; and U.S. Federal Government and U.S. Military service, activity duty or Commissioned Corps (e.g., USPHS, NOAA) were combined for both groups. SOURCE: EAPSI Applicant Survey–Items D1c, D2 and D3. NSRCG Survey 2008–Items B1, B11 and B12.